A new twist on classic chain mail *p. 50*

MARCH 2016

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Porcelain, glass, 18k-gold, and sterling silver pendant by Patty Schwegmann, p. 42

Porcelain & Ceramics

See how artists play with clay *p. 42*

HOW TO add gold and not break the bank

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Spotlight on Education

Jewelry making in and out of the classroom

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Volume 12 • Issue 3

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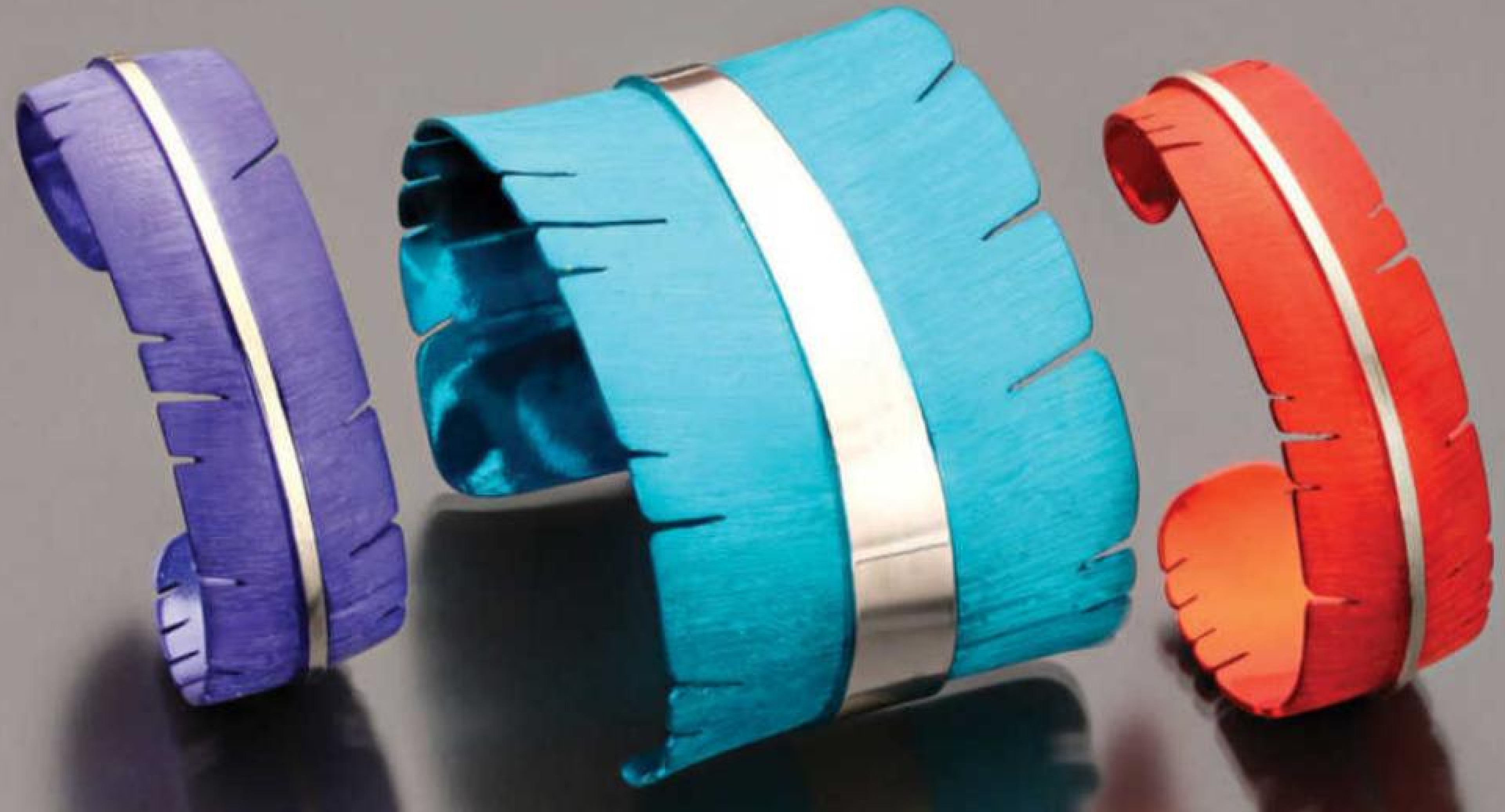

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March 2016

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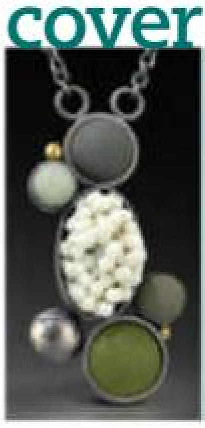

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See "Tricks against Nicks" to learn how to protect your wire from tool marks.

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Learn the ins and outs of working with pickle.

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METAL | **BEGINNER**

Textured Copper Roll-top Earrings

A bit of forging and handmade ear wires turn a simple sawing exercise into a snazzy pair of earrings.

by Reidin Dintzner

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A very fond farewell

When I arrived at *Art Jewelry* 10 years ago, one of my first tasks was to write the editor's letter. It seemed natural, as the new Editor coming to an established magazine, that I tackle the topic of change. Change can be exciting, I said — as artists who explore and push boundaries, *Art Jewelry* readers know this better than most. But change is also scary, and change often means casualties, and the temptation to curl up and stay where it's warm and comfortable and life is not uncertain can be … well, all too tempting.

Now we're facing another change: This will be the last issue of *Art Jewelry*. This letter now allows me to express my thanks to all those who have supported us over the years. All the editors and artists who have worked to create a magazine that has never failed to make me proud. All the contributors who have so generously shared their expertise. All the advertisers who have supported us. And especially all the readers who have followed us, who have sent in photos of their work, who have praised us when we got it right, and not minced words if we got it wrong.

The community of jewelry makers is facing lots of changes, and will face more changes in the years to come — in the materials we use, in the way we learn, in the ways we communicate. But for all the changes we face, remember this: People have been creating jewelry since people first knew they *were* people. That's *not* going to change. To those who participate in a craft that has endured for millennia, I have every confidence you'll rise to the challenge of change — even though some of the changes might be scary.

> People have been creating jewelry since people first knew they *were* people. That's not going to change.

Hazel Wheaton

You can still find us online at www.artjewelrymag.com.

ArtJewelry

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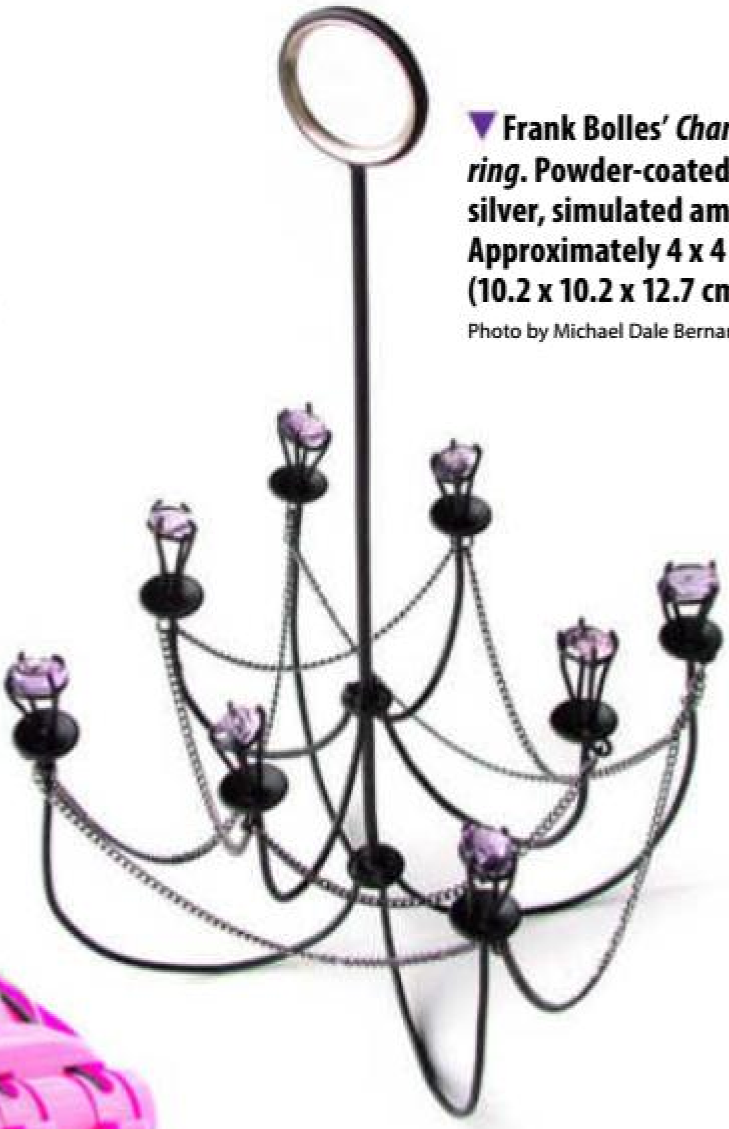
CONFERENCE

Zoom Milwaukee

What: Join approximately 300 makers at UW-Milwaukee's Kenilworth building, a six-story facility of studio, exhibition, and instructional spaces, for a variety of lectures, exhibitions, museum tours, and think-tank sessions. Explore new crafts or fine-tune your current skill set with workshops focusing on blacksmithing, 3D printing and design, enamel, resin work, laser cutting and etching, video artist-statement creation, and more. Affordable accommodations are available through University Housing.
When: May 25–29, 2016
Where: University of Wisconsin-Milwaukee, Milwaukee, Wis.
For more information: www.zoommilwaukee.com



▼ Frank Bolles' *Chandelier ring*. Powder-coated copper, silver, simulated amethyst. Approximately 4 x 4 x 5 in. (10.2 x 10.2 x 12.7 cm).

Photo by Michael Dale Bernard.

▼ *Enable Hand* by Frankie Flood. Rhino designed, printed on a Makerbot. 3D-printed ABS, Velcro, cables. Approximately 11 x 4 x 4 in. (27.9 x 10.2 x 10.2 cm).

Photo by Frankie Flood.

▼ *Gothic Goggles* by Sarah Shuler. Machined, etched, fabricated. Anodized aluminum, acrylic, brass, leather. Approximately 8 x 2 x 3 in. (20.3 x 5.1 x 7.6 cm).

Photo by Frankie Flood.

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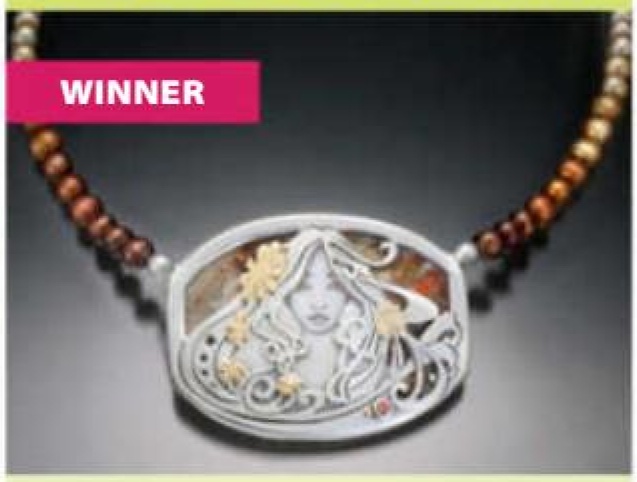
READER TIP
READER FEEDBACK
BOOK REVIEW

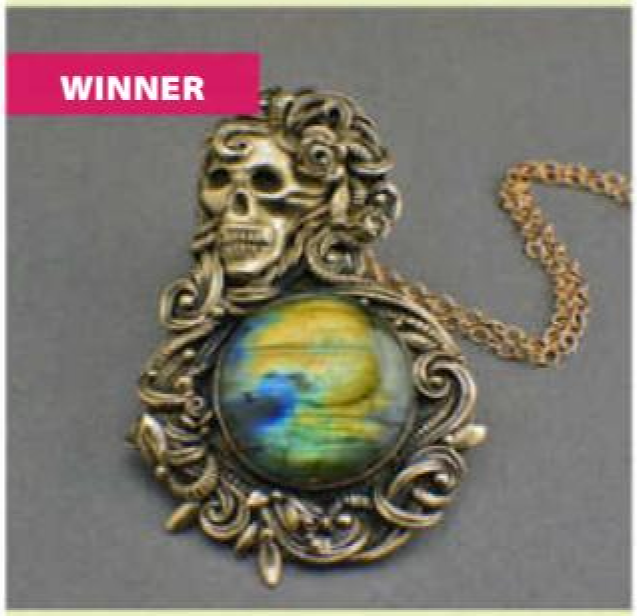
While you are at Zoom Milwaukee, be sure to check out the ArtCycle! Learn more in "When Craft and Bikes Collide," *page 60*.

READER CORNER



Monthly Design Challenges

September 2015: Spirit of the Earth
Artist: Kelly Morgen
Gaia, Earth Mother necklace
Inspiration: "The great Mother Earth, Gaia, is the nurturing life force that exists throughout the world. A goddess of abundance, creativity, and fulfillment, she is shown here adorned with golden flowers. Gaia helps connect us with the energy of the world and reminds us we all have a sacred place in the universe."
Materials used: Sterling silver, hand-carved and scrimshawed recycled piano key, crazy lace agate, 18k gold, Australian opal, pearl.
Dimensions: Approximately 1¾ x 1⅜ in. (44 x 35 mm)
For more information: www.kellymorgen.com



October 2015: Skeletal
Artist: Rodica Frunze
Field of the Soul pendant
Inspiration: "This piece symbolizes the 'death' of our constructed beliefs, which allows the purity of the soul to shine. It was built around a labradorite ('stone of the spirits') with flashes that

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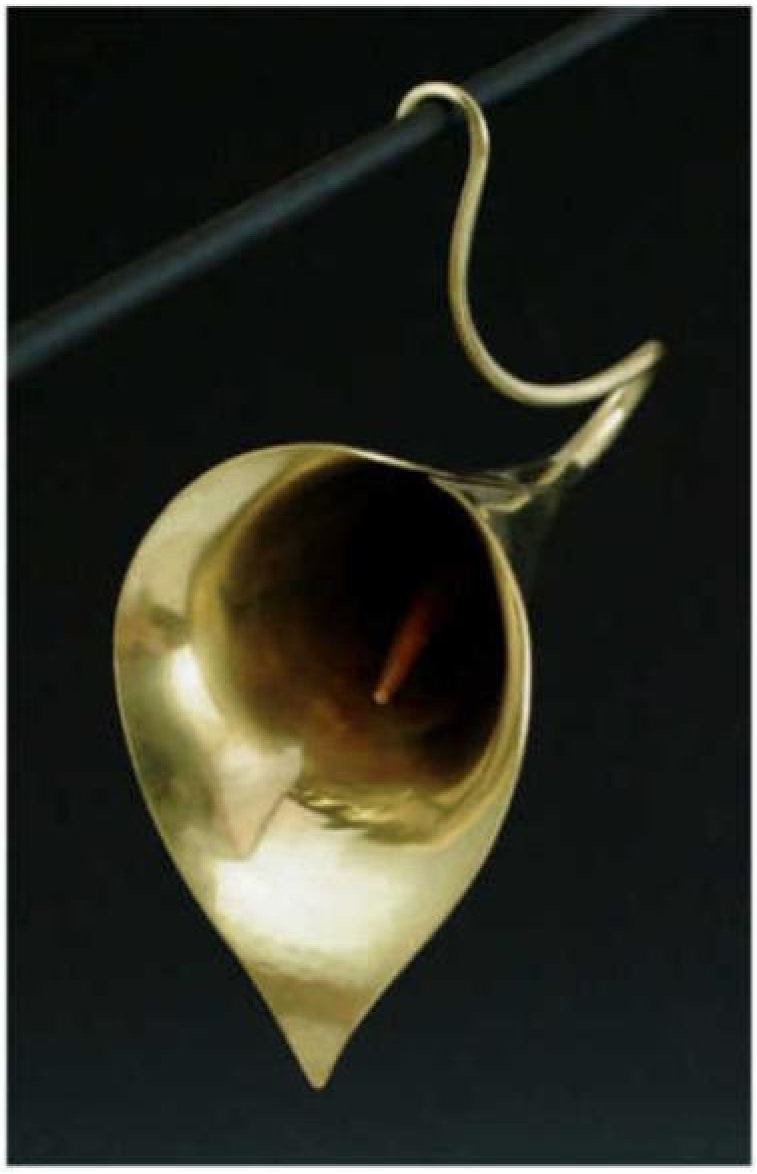
WORKSHOP

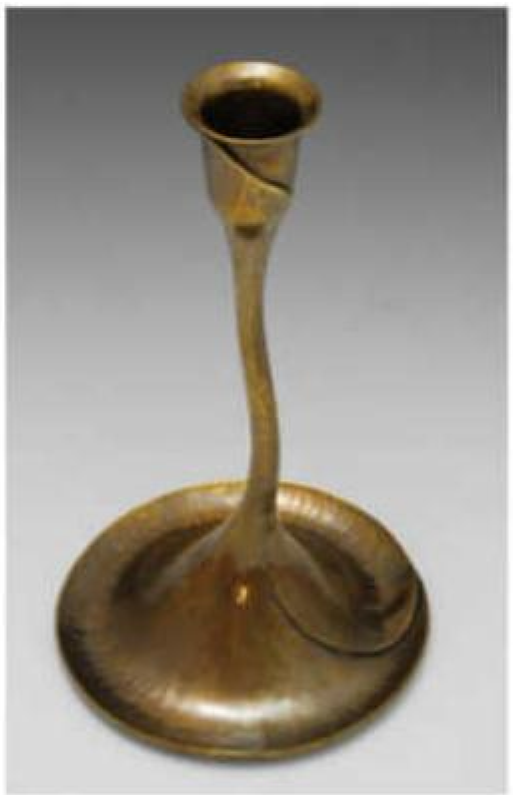
Making a Spiculum

What: Start with a flat sheet of metal then raise it into a tapered hollow form and you have a spiculum. Spiculums, commonly seen as teapot spouts, can also be incorporated into sculptural or jewelry pieces. Join instructor Steve Shelby for this three-day workshop to learn his simplified method of making a spiculum. Students will start with practice drills and move on to more creative work. Depending on the pace of the students, there may be an opportunity to complete a finished piece, a standalone sculpture, a piece of jewelry, or a component to incorporate into a larger work.
When: March 16–18, 2016
Where: Genevieve Flynn Studio, Kansas City, Mo.
For more information: www.genevieveflynn.com

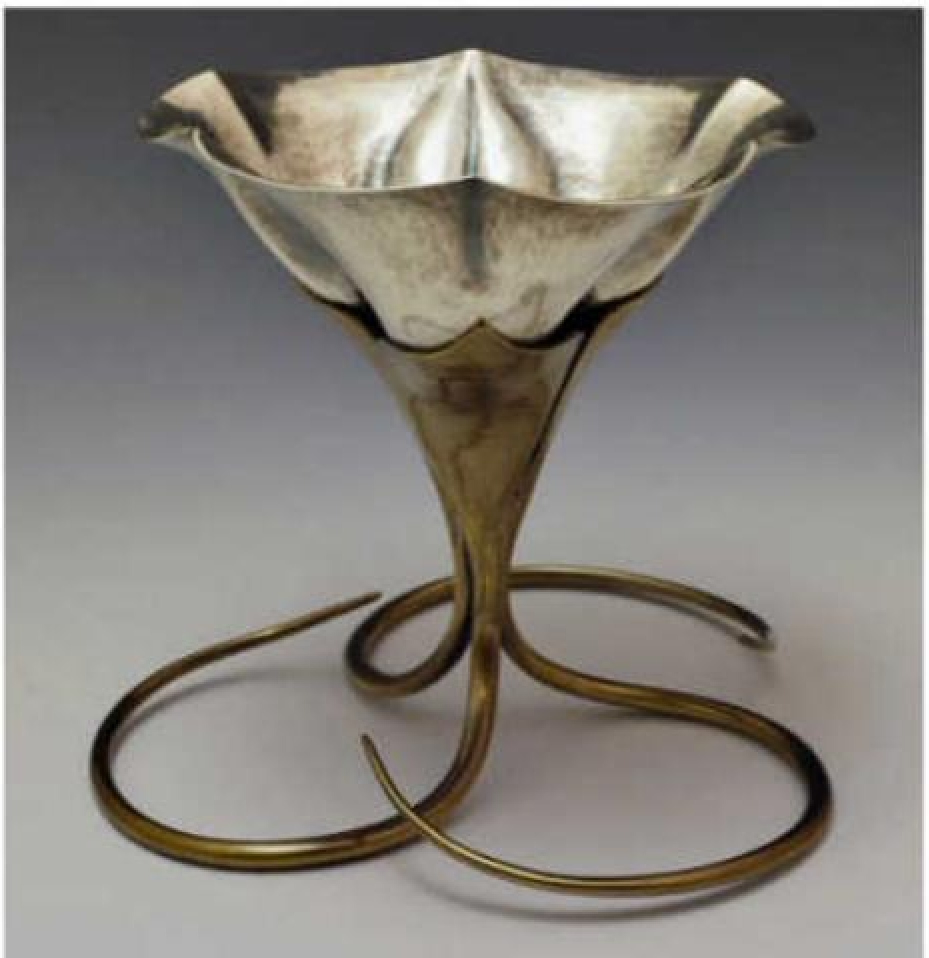


▲ ***Calla*** **by Steve Shelby. Brass and copper. 7 in. (17.8 cm).**

▼ ***Medium Candle Holder*** **by Steve Shelby. Brass. 4 x 7 in. (10.2 x 17.8 cm).**



▶ ***Frog Bowl*** **by Steve Shelby. Sterling silver and brass. 7 x 7 in. (17.8 x 17.8 cm).**



PRODUCT REVIEW

FIMO True Colours Polymer Clay

EDITOR TESTED

STAEDTLER
FIMO
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True Colours
Vraies couleurs
Colores reales
Modeling clay
Pâte à modeler
Pasta de modelar
6 x 57 g (2 oz); 342 g (12 oz)
6 pc/pz

WHERE TO BUY

FIMO Professional Oven-bake Clay
True Yellow, True Red, True Magenta, True Green, and True Blue, 57 g (2 oz.) blocks: $3.75
FIMO professional True Colours Blending Kit: $22.50
Staedtler, www.staedtler.com; Local or online polymer-clay suppliers

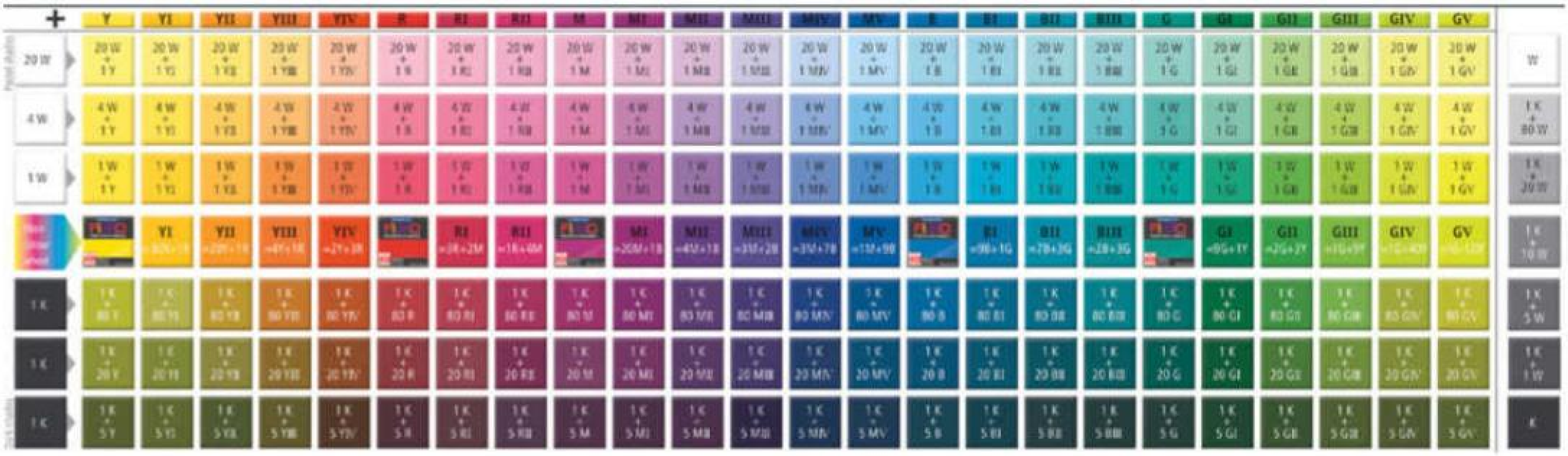
One of my favorite classes in art school was color theory. We learned how to use only one warm and one cool shade each of red, yellow, and blue gouache (plus white and black) to study color. When I first tried Staedtler's new FIMO Professional True Colours system, I immediately equated it with those color-theory exercises and mixing colors of paint on a palette. One thing that can mess up what you think will be a good mixture of clay is not knowing what combination of colors (and their temperature, opacity, etc.) were used to make a particular color of prepackaged clay. Well, FIMO takes the guesswork out of mixing by using only one pigment per color. Yellow, red, magenta, blue, and green (plus white and black) — what you see is what you get!

If you're one of those people who love recipes for mixing specific colors of clay, Staedtler has you covered. They have done the heavy lifting, and put together a stunning chart of 175 colors *(below)* — and include mixing instructions for each color. I'm more of an "eyeball-it" kind of person when it comes to color, but I also love categorizing and making samples, so I wanted to give the color-mixing chart a try. I dived right in and started mixing up a range of colors.

If you can open it without tearing it (I was a little too excited and ripped mine), the thicker plastic packaging is resealable, making it easy to store unused clay. As with the other colors in the FIMO Professional line (formerly FIMO classic), the True Colours were a little crumbly at first, but quickly became easy to work with when conditioned. Make sure you condition the clay thoroughly, however: chunks of clay stuck to my roller and work surface if it wasn't completely conditioned when I tried to roll it out. This clay is soft, but not too soft, holds detail well, and is just an all-around joy to work with. The pigment does tend to stick to your hands a bit, so wash your hands between colors.

I decided to mix up a few colors of the main color wheel/row following the chart instructions. This row contains a range of colors (24 including the packaged clay) created by mixing colors straight from the package in various ratios, and is the base for all additional tints and shades. To make the main color wheel, condition each color of clay, roll them all out to the same thickness, and use a shape cutter to cut the correct number of shapes for the color you're trying to achieve (for MIII, that's three magenta and two blue). Mix the clay until it's evenly blended. Then, if you want it lighter or darker, add white or black, again following the chart.

What's great is that this mixing system works for whatever quantity of a color you need. Only need a bit? Use small shape cutters and roll the clay thin. Need a color in bulk? Roll the clay thick and use a cookie cutter! It's an adaptable — and most importantly, repeatable — color-mixing system I'm excited to add to my stash. —*Annie Pennington*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incorporate the green of the field along with the blue and yellow sunny skies. I wanted to portray the taboo of death in a way that would remove the fear that usually accompanies the idea. Depicting the skull as a source for the living, adorning her with easily recognizable feminine characteristics and a little touch of whimsy, removes the darkness of the subject."

Materials used: Goldie Bronze metal clay and labradorite
Dimensions: Approximately $2\frac{15}{16}$ x 1¾ in. (75 x 44 mm)
For more information:
www.sky-and-beyond.com

SPOTLIGHT READER TIP #1

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Permanent Ruler

"I used a fine-tip permanent marker to draw an accurate ruler directly onto my work surface. I can now quickly measure wire or chain without having to search all over for a ruler."

—Dawn Lawrence Floen, Alberta, Canada

Dawn received a $100 gift certificate courtesy of our Tip sponsor, Contenti (www.contenti.com)

PRODUCT REVIEW

Gold Test Solution Kit, Testing Stone, Testing Needles

WHERE TO BUY

Test Solution Kit: $19.95
Testing Needles, Set of Five: $46.95
Testing Stone: $20.50
Rio Grande, www.riogrande.com

The purity of gold is based on a 24-point scale, more commonly known as karats. A piece of 10k gold is only 10 out of 24 parts gold, or 41.67% gold. Knowing the purity of your gold is important for repair work, reclaiming scrap, or establishing the value of a piece. There are electronic gold testers, and high-tech X-ray fluorescence spectrometers available, but they can be pricey. If you're looking for an easy and inexpensive way to check the purity of gold, an acid test is your solution.

I dug up four pieces of gold to test: three rings and a gnarly old gold tooth (honestly, you never know what you'll find in my attic). Only two of these pieces were stamped (guess which ones!).

Each of the testing needles is tipped and stamped with a different karat of gold. I drew wide parallel lines with each of the needles across the smooth surface of the testing stone, and labeled each line with their corresponding 10-, 14-, 18-, and 22k. After designating each test line A–D, I used my mystery items to draw four more wide parallel lines across the stone.

Working under the studio vent and garbed in an apron, gloves, and safety glasses, it was time to apply the acid.

Starting with the weakest acid, 10k, I drew a steady line of acid across the eight parallel lines and waited. The 10k acid will dissolve or discolor anything under 10k. After a short time, I dipped the stone in a neutralizing solution, rinsed it in water, and dried it with a soft cloth. Reviewing the lines, I saw that there was a slight change in one of my mystery test ring lines, but the 10k control line remained.

It was a snap to run through the rest of the acids and determine the results, although sometimes the results were easier to read when the stones were still wet from the rinse water. According to the acid test, the two stamped rings were correctly marked, and that filthy gold tooth had the highest purity of gold of the test pieces.

It's also important to keep in mind that gold solder could be a different purity than the rest of the piece, which would yield mixed results. So avoid testing soldered areas if possible. *—Theresa D. Abelew*

Silver Test Solution
10K Gold Test Solution
Platinum Test Solution
22K Gold Test Solution
14K Gold Test Solution
18K Gold Test Solution
EDITOR TESTED

READER FEEDBACK

Polymer Retreat

"For the past 10 (or so) years, a group of artists rent out a house and work (or not) in our makeshift studio together. This time, our retreat coincided with the November 2015 issue of *Art Jewelry* (it's a particularly good issue for polymer folks).

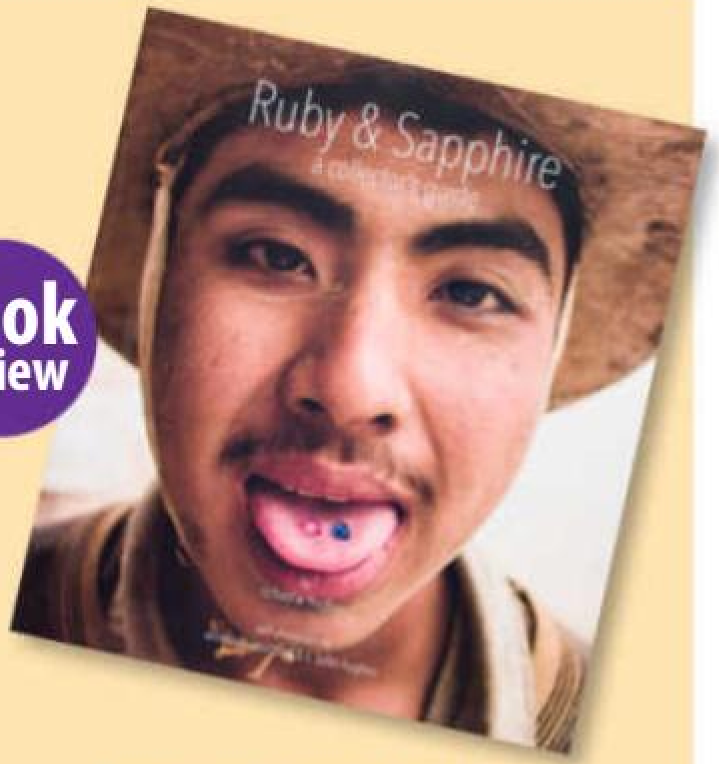
"Our little group couldn't quite believe Claire Wallis' tutorial 'Basic Polymer Caning — with a Twist!' Really? Simply offsetting a Skinner blend could result in this? We had to try it! One person read the instructions while the rest of us followed along with clay. And yes, we all sort of screwed up the first time, but that didn't stop us. Once we got it, we could not leave the concept alone."

—Cynthia Tinapple, via email

Samples made by Meisha Barbee, Cynthia Tinapple, Dayle Doroshaw, and Julie Eakes.

Ruby & Sapphire: A Collector's Guide by Richard W. Hughes

Book review



ISBN: 978-616-91450-3-5
Gem and Jewelry Institute of Thailand, 2014
384 pages
$149.00 (To purchase: www.git.or.th)

Let's deal with the obvious: this is not a cheap book. Its price means that anyone considering buying it will be thinking about it as an investment, not as a spur-of-the-moment purchase. So the question is: Is the investment worth it?

I firmly believe that an expert's opinion is worth paying for. And in the field of gemology, Richard Hughes' standing and reputation is stellar. Hughes worked with gifted photographers Wimon Manorotkul and E. Billie Hughes to create the finished volume.

As I read through the book, I found I was struggling to classify it. Scientific information about sapphires and rubies and sphires was interspersed with excerpts from historical records; insight on how to interpret lab reports shared space with a rundown of gem sources, country by country. And throughout were photographs — glorious, intriguing, sometimes surprising (lemur!), often challenging photographs that contrasted the beauty of the stones with the realities of the locations where they're mined.

Part scientific tome, part historical document, part travelogue, this book defies description. I can say that it's endlessly fascinating, either as a sustained read or in bits and pieces. This book belongs as much on your coffee table as in your studio library. And yes, if you're a gem lover, it's worth the money. *—Hazel Wheaton*

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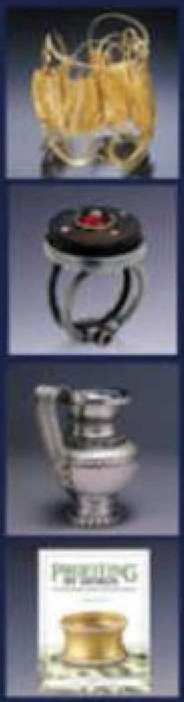

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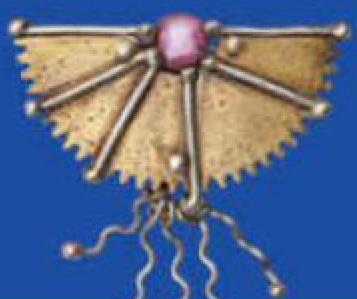

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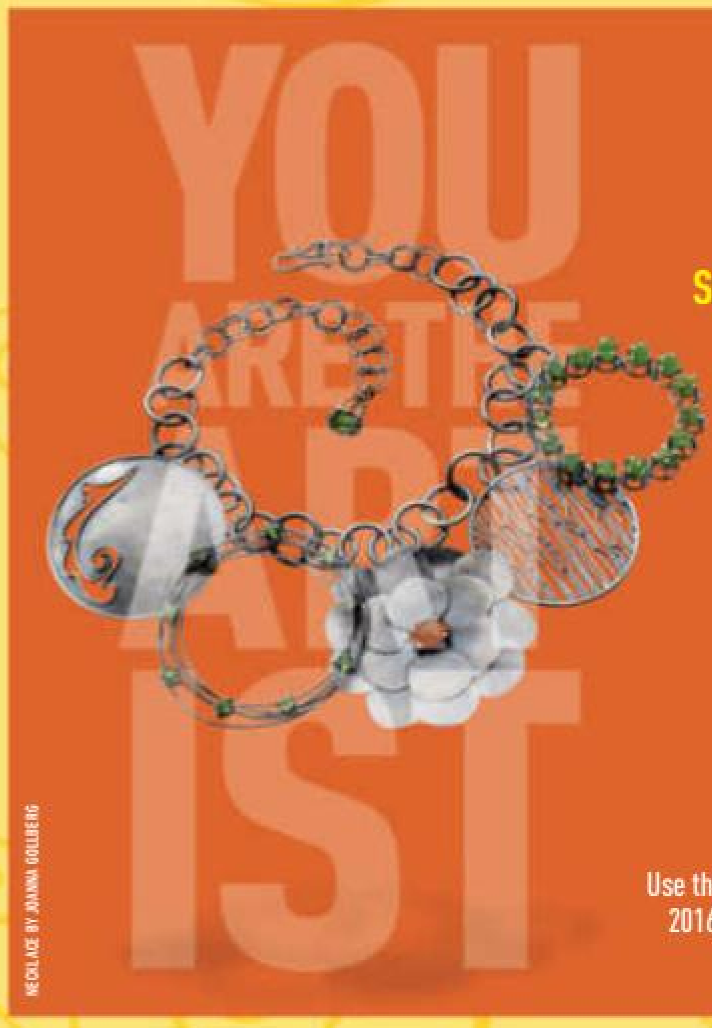

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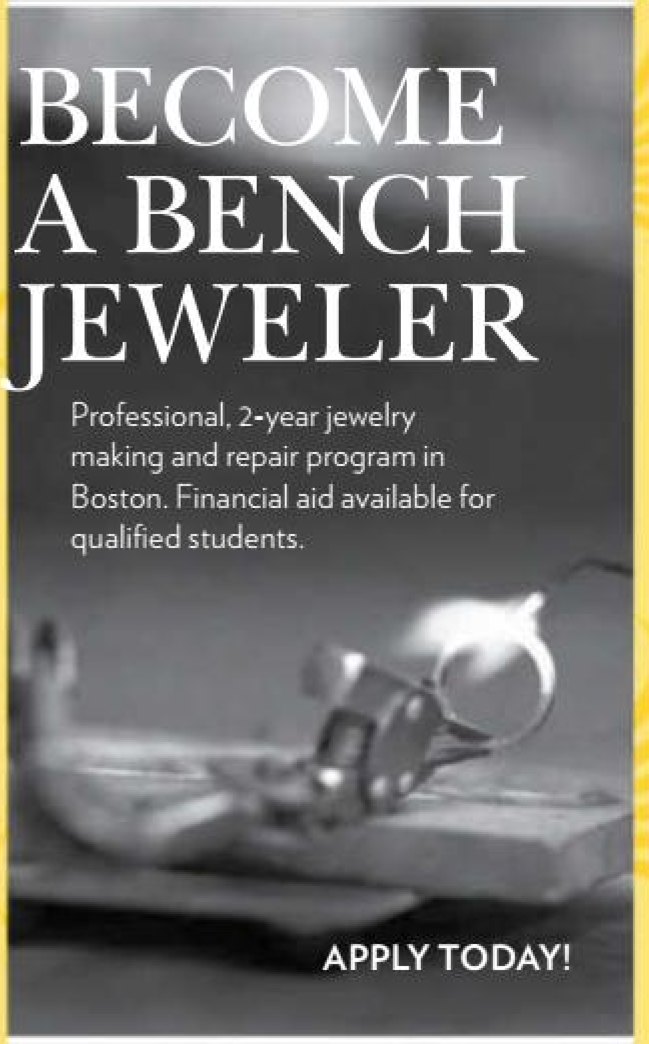

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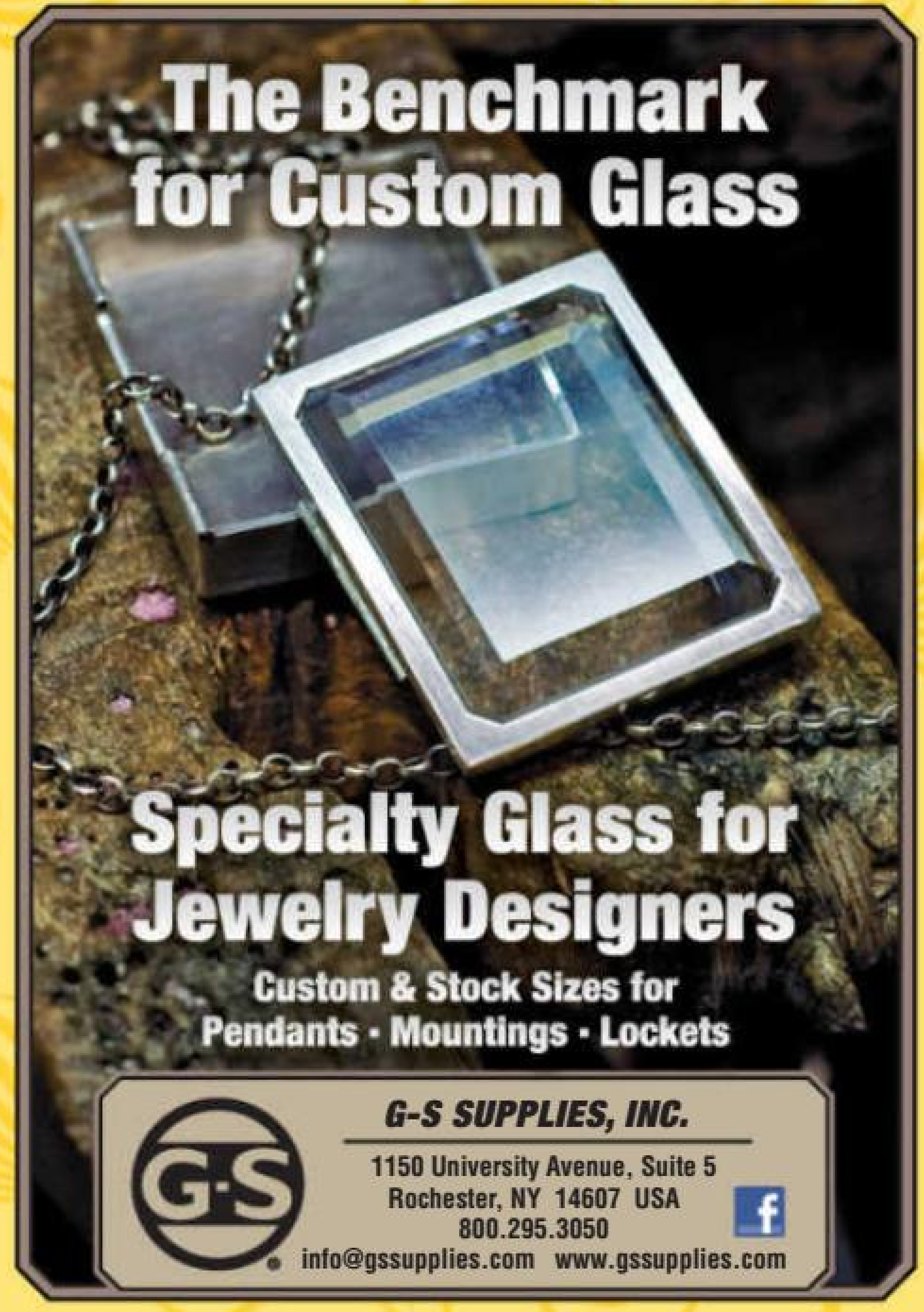

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Spotlight on Education

Take Advantage of ~~Getting Over~~ Your Mistakes

by Marlene Richey

We all make mistakes. I've never actually met anyone who has (seriously) claimed they've never made a mistake. But, simply accepting that mistakes are inevitable isn't enough to get you to a healthy place regarding making them. Mistakes are valuable teaching tools, but only if you make the effort to learn from them. Too many people shy away from their past errors and do their best not to even *think* about them. That's a sure prescription for making the same mistake again in the future. But admitting your mistakes, examining them in all their (sometimes excruciatingly) embarrassing detail, and learning from them — that makes the difference in business and life.

Coming clean

I'll start by telling you one of my huge, disaster mistakes. My former partner, Bill Richey, and I had always been juried into the Baltimore American Craft Council (ACC) show — indeed, we wrote most of our spring business there. One year, I applied to both the ACC show and the Alternative Show, which was held at the same time. I decided to save some money, and took the application pictures myself.

Now, here was my thinking. I had studied photography in college and considered myself to be quite a good photographer. I had upped the number of applications, which meant upping the number of application fees — *surely* it was in my best interest to save some money. And after all, the show was familiar with our work; we were a known quantity, and at this point, after so many years, wasn't the entry almost a formality?

No prizes for guessing what happened. We didn't get into either the ACC Show or the Alternative Show. We might never have known why, except the manager of the Alternative Show was kind enough to call me; she said that of course the jury was familiar with Bill's work, but just *who* had taken those pictures? I was devastated. We lost a huge amount in sales that season, and it was all due to my decision to save money, and my assumption that my college-aged dabbling with photography was a substitute for a pro who knew what he was doing.

The trick to capitalizing on your mistakes is to make sure you never make the same mistake twice. Since that experience, I have always used a professional photographer.

Yes, I have made numerous mistakes in business. But I am in heady company with the people who invented Viagra, microwave ovens, Silly Putty, chocolate-chip cookies, penicillin, Wheaties, Post-It Notes, the color mauve, saccharine, the pacemaker, Play-Doh, tea bags, plastic, and the Slinky, just to name a few. All these luminaries had stumbles on their path to immortality. So, I asked around, and got some good stories from people in the jewelry world about what they have learned from their past missteps.

> "Good judgment comes from experience, and experience comes from bad judgment."
> — *Rita Mae Brown*

Case studies

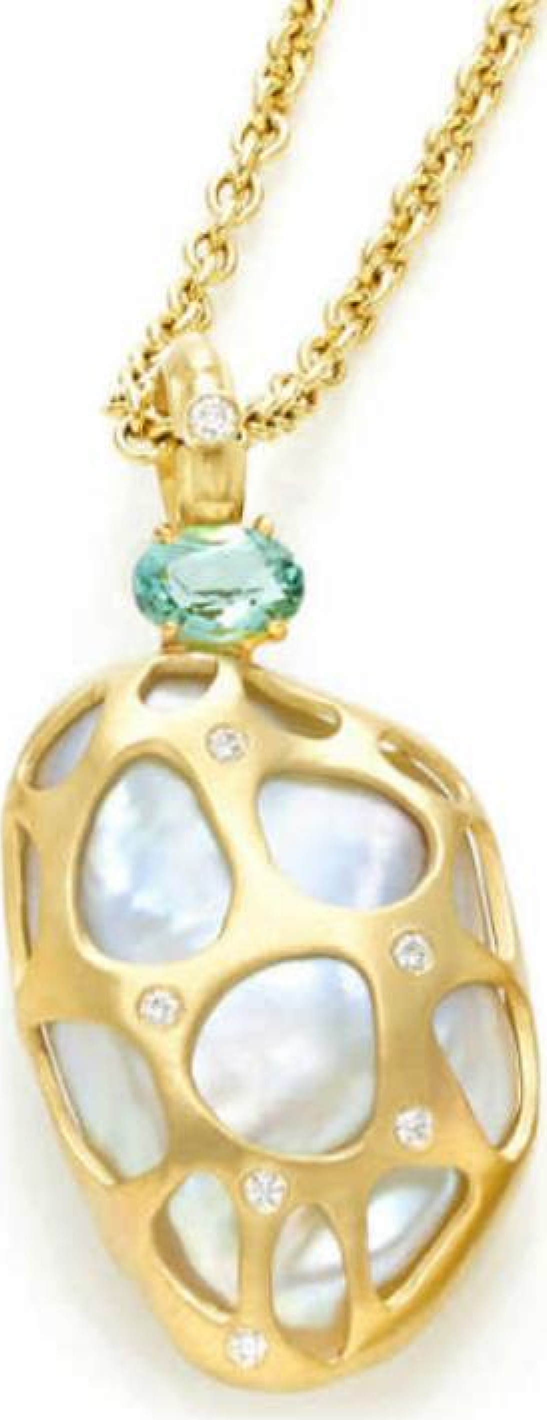
Chris Nelson, jewelry designer

"In my first five years of making jewelry, I showed my work to galleries hoping to consign it. As I had studied with several professional makers/instructors, my work contained many different techniques/processes I had learned. Galleries would not touch my work, as they said the pieces were not a cohesive body of work. I would walk away with my feelings and artist's pride hurt.

"After taking six months off in 2008, and working in clay and printmaking, I came back with a different vision. I began to create work with a common element or elements. I wouldn't build a new piece that was different from the style I was working in, unless I created a small body of work that bridged from one piece to the next. The changes were sometimes subtle, and sometimes drastic, but there were always transition pieces to create a flow so my work was recognizable. This led to my branding my steel/fused-gold work as Urban-Armour in 2010. Even today, I won't make something too distant from previous pieces without creating transitional pieces that will keep the onward, recognizable flow going."

Jane Bohan, jewelry designer

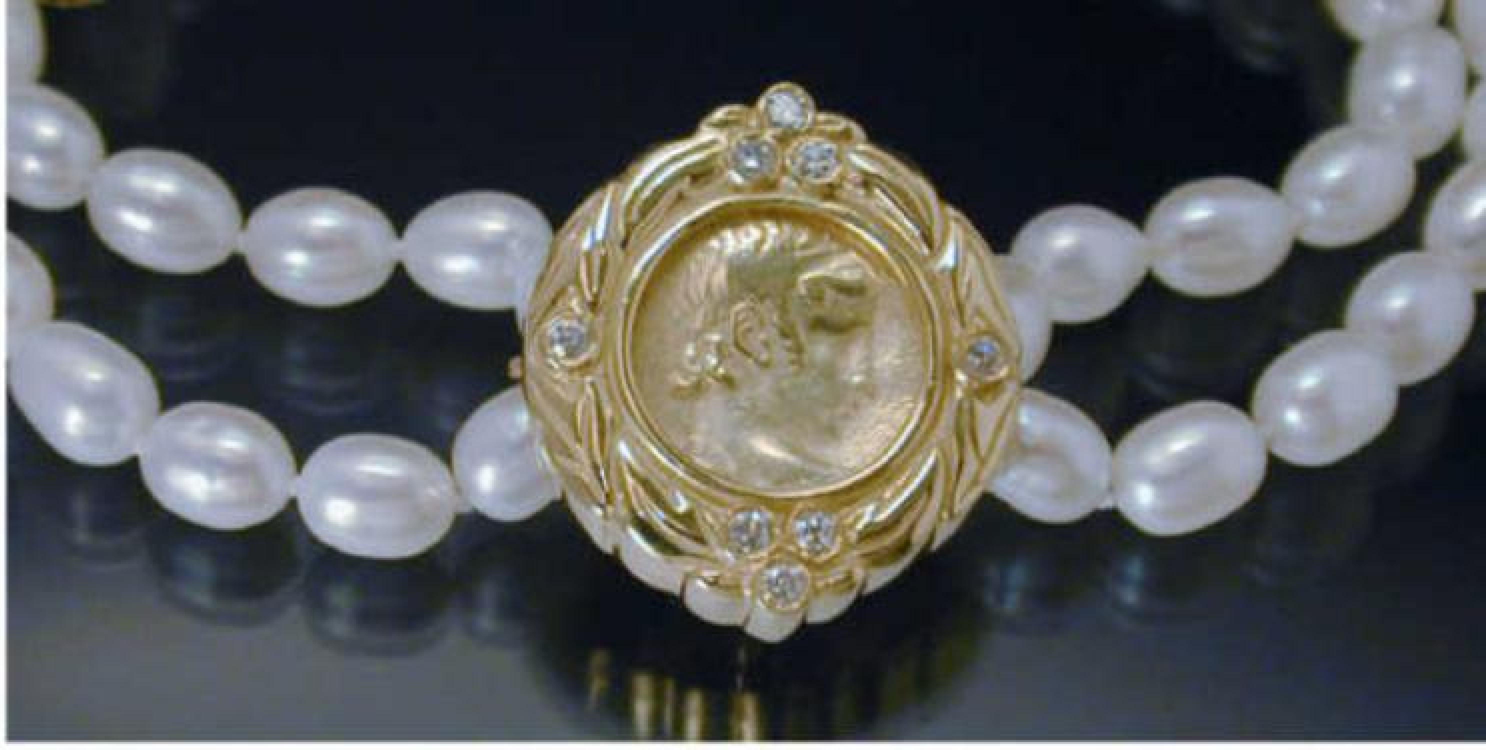
"We had a very popular necklace which we decided to make the centerpiece of a national co-op advertising campaign. The chain used in the necklace had been purchased from a German manufacturer,



▲ **A one-of-a-kind 18k green gold, freshwater baroque pearl, green tourmaline, and diamond pendant from Jane Bohan.**

but we ran low and didn't have enough in stock to fill our fall orders. Unfortunately, we hadn't thought to check in advance with the factory regarding their production capabilities or schedule, and their three-week holiday in August caught us completely off guard.

"The last thing we wanted was to ship orders without the centerpiece of the co-op ad! We contacted every designer we knew stateside who used the chain and bought it from them. We found enough to tide us over until the German production became available again. This experience taught us to be very clear about sourcing timelines that would impact our in-house production, and to maintain good relationships with other designers/manufacturers."



▲ **A gold and diamond enhancer on a double strand of pearls shows Paul Robilotti's Roman and Greek influences.**

▶ **The Quadrum Gallery, in Boston, Mass. Manager Sia Maravalias abides by "The Law of the Garbage Truck."**

Paul Robilotti, jewelry designer

Paul told me the story of his first show — it was a national jewelry trade show, and he wanted to conquer the world. (Perhaps that was fitting, since his jewelry is based on Roman and Greek design!) So, for his display, he carried in two eight-foot plaster columns along with a marble fountain suitable for the Roman Colosseum! While standing there admiring his colossal efforts, he says, "I realized that we then had to fill [the fountain] with water."

So, off he went with only a flower vase to fetch water again and again and again. The icing on the cake? After an exhausting trade show came the sick realization that he now had to dismantle and remove his wannabe Trevi Fountain in reverse order, starting with the water … one vase-full at a time. Suffice to say, the Robilotti display at the next show was significantly toned down. The fountain and columns are truly the stuff of show legend, however!

Perhaps that is the key takeaway — if mistakes make great stories, then epic mistakes make epic stories. If you look back on a mistake as a story, divorced from your ego, you can see that it has a beginning, a middle, an end … and a moral. Learn from your mistakes, prosper from them, and maybe even get rich off of them. Now, go out there and make some wonderfully inspiring mistakes!

Sia Maravelias, manager (Quadrum Gallery, Boston, Mass.)

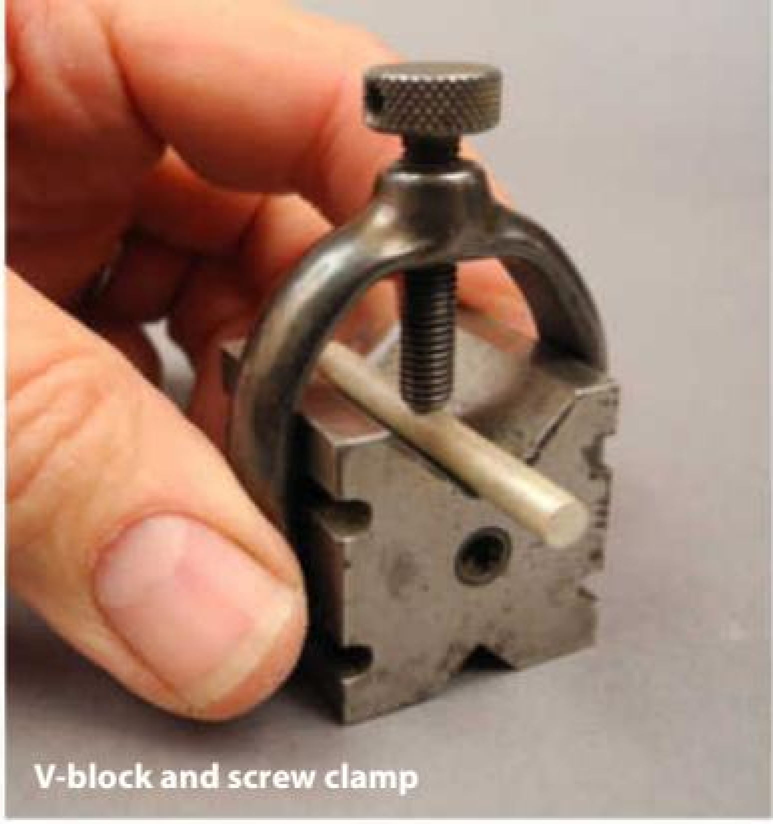
"I was given 'The Law of the Garbage Truck' years ago and have it printed above my desk as a constant reminder to 'Let no one steal your peace.' The story goes:

"Many people are like garbage trucks. They run around full of garbage, full of frustration, full of anger, and full of disappointment … As their garbage piles up, they need a place to dump it, and sometimes they'll dump it on you. Don't take it personally. Just smile, wave, wish them well, and move on. Don't take their garbage and spread it to other people at work, at home, or on the streets. The bottom line is that successful people do not let garbage trucks take over their day. Life is 10 percent what you make it and 90 percent how you take it!"

In her more than 30 years in the jewelry business, Marlene Richey has run a wholesale business and a retail gallery. She can be reached by email at marlenerichey@gmail.com.

Hang On

by Christopher C. Darway



V-block and screw clamp

Studies have shown that the human thumb and index finger can exert 15–19 lbs. of pressure. Those researchers were never in my homeroom to experience a pinch by that miscreant Ricky Folger (who I swear generated 1,900 lbs.). Nor did they have Aunt Ethel, who unleashed her death grip on my cheek at family gatherings and left a welt. Our hands, with those wonderfully opposable thumbs, enable us to make things. We use these digits as tweezers, grippers, and clamps. But, like all mortals, we can use help. Enter the clamp.

Clamps can be grouped into four general types based on their classification of working: wedge, screw, spring, and toggle.

Wedge clamp

This mechanism probably predates the other types of clamp, and is based on two simple machines: the wedge and the lever/fulcrum. A **ring clamp** is the most common example used by jewelers. They are made from wood, plastic, or metal. They usually have one rounded end and one straight, with leather inserts so as not to mar the metal being held and to provide a secure grip. Use them to hold rings, wire, and small pieces of sheet, and to grip wire when coiling it to make jump rings. They are cheap and should last a lifetime.

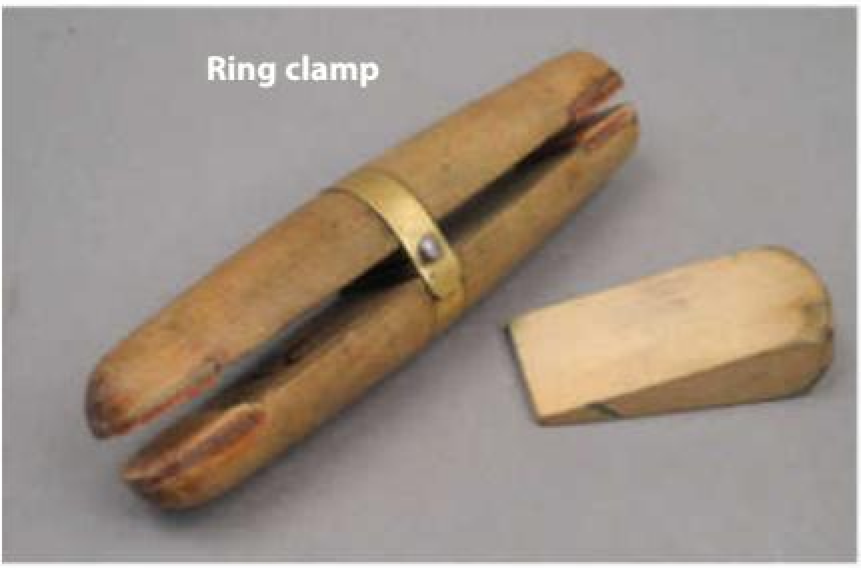
A **ring-setting clamp** technically falls into the screw-activated category, but it's designed to hold a ring, so I wanted to mention it here. When you tighten a screw on the clamp, a nylon sleeve expands inside a ring shank, holding it securely. I picked one up at Harbor Freight and was surprised at the quality. Mine was made in India and came in a nice wooden box with clear instructions.

Screw clamp

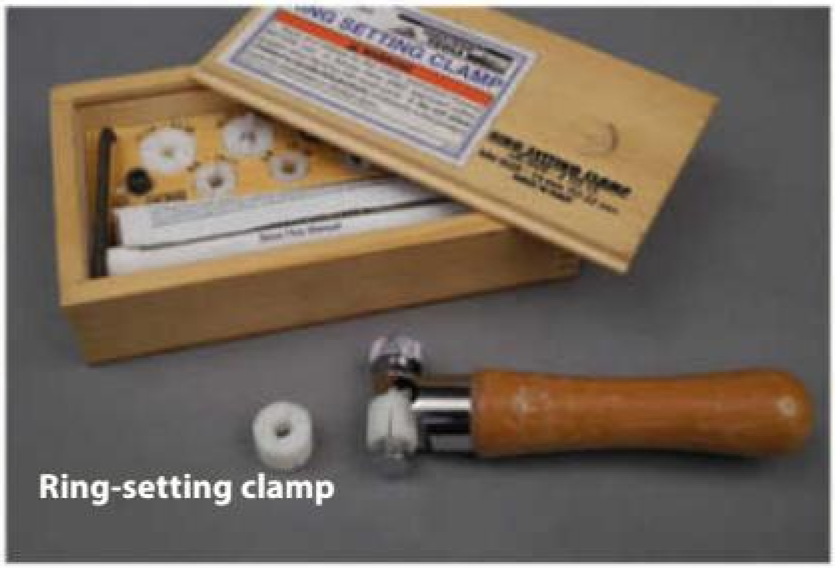
Screw clamps use a screw to exert pressure for holding things in place. The first thing I look for when I teach a workshop at a new location is the milk crate full of **C-clamps**. Why? Because they are versatile. They're used to hold down bench pins, tabletop machines (like a drill press), bench vises, and other tools that would normally be bolted down. C-clamps are also great for holding wood or other materials together when using adhesives. Most C-clamps are made from malleable iron, for safety. You would not want a C-clamp made from a brittle material, as it could break apart if excessive force is placed on it. I have some that are made from cast steel, aluminum, iron sheet, brass, and plastic. The nonferrous clamps are small and should be used only for light-duty work.

Another type of screw clamp is called a **bar clamp**. I have a set of brass bar clamps that I use only with wood or plastic when making box forms. The bars are 10 in. (25.4 cm) long, and are small versions of woodworkers' bar or pipe clamps. You can get them from most hardware stores and model-building suppliers.

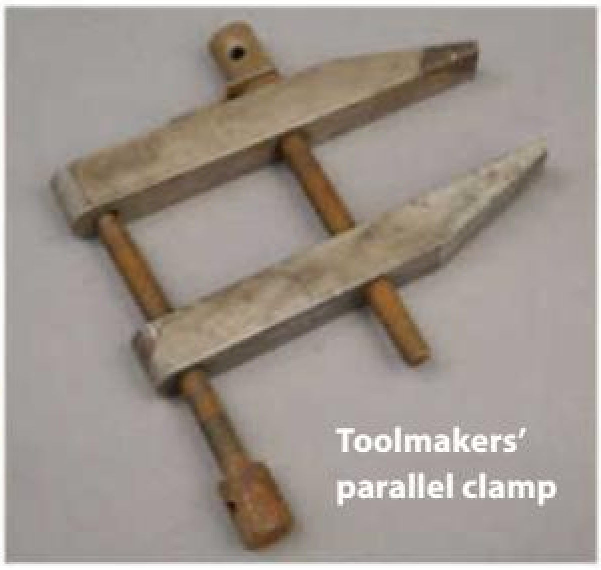
In this family of screw clamps is the **toolmakers' parallel clamp**. Design-wise, this is identical to the parallel clamp used by woodworkers — only smaller. Unlike C-clamps, toolmakers' clamps are made from hardened steel. There's no fear of the steel jaws breaking, because the pressure exerted on them comes in the form of compression. They use two screws instead of one to tighten. An American-made Starrett parallel clamp can cost $60, and that's for a clamp only 1½ in. (38 mm) long. Check flea markets for one of these, as most people don't know what they are. They are sweet.



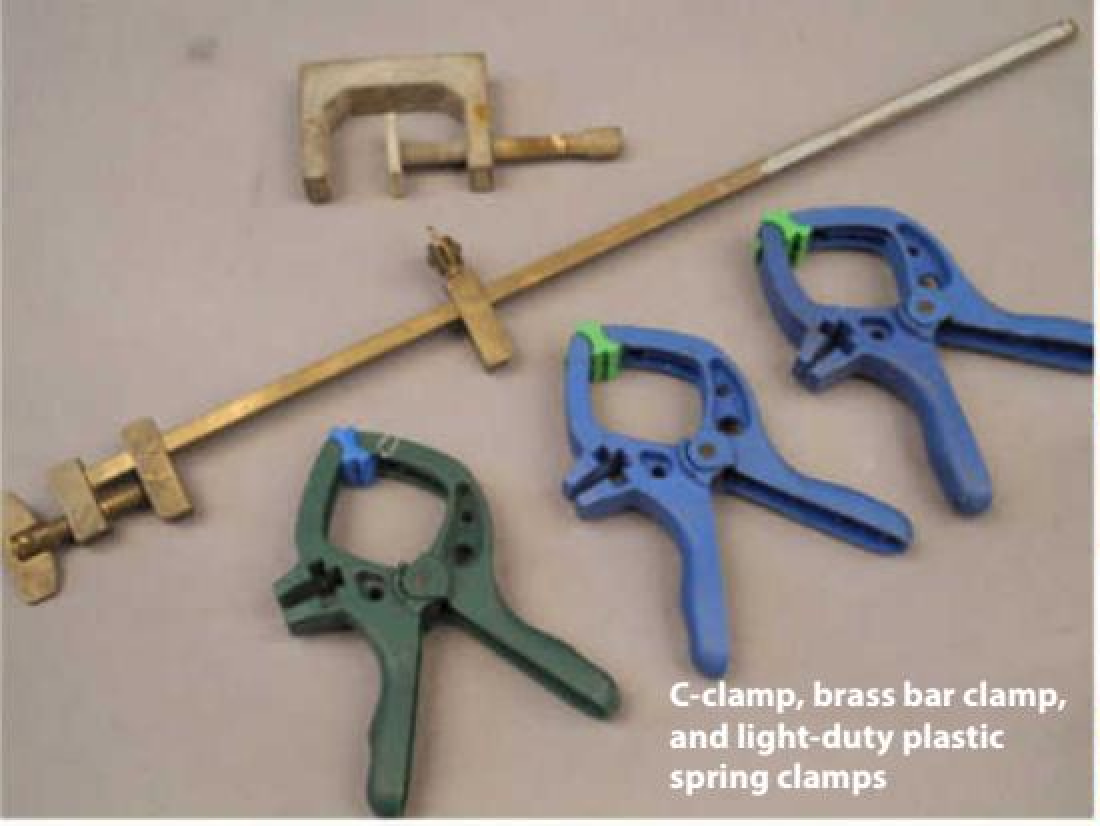
Ring clamp



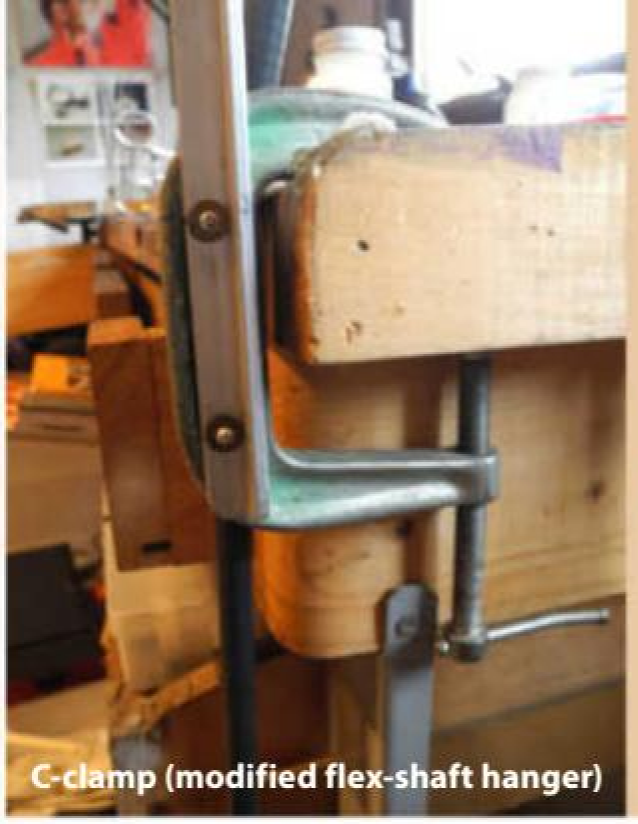
Ring-setting clamp



Toolmakers' parallel clamp



C-clamp, brass bar clamp, and light-duty plastic spring clamps



C-clamp (modified flex-shaft hanger)

Subscribers: Learn two ways to turn a C-clamp into a flex-shaft hanger at **www.artjewelrymag.com/reference**.

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While we're in the machine-shop realm, there's another more specialized clamping tool called the **V-block and screw clamp**. These are cubes of steel: the top surface has a V cut into it, and two opposite sides have grooves or slots. The grooves allow a U-shaped piece of steel to be slid onto the block. The apex of the U is drilled and threaded. A screw is inserted into the U, and is tightened to hold round rod or tubing in the V-groove. These tools are usually used in pairs to hold rods and tubes while drilling them with a drill press. Remember, these are made from the highest-quality steel, precision ground, and heat-treated for hardness. A really good set can cost as much as $600, but that's overkill for most jewelers. Offshore-manufactured V-blocks run around $40.

If your studio is equipped with a vacuum machine, air compressor, water sprayer, or other machine that has a hose attached to it, you will need **hose clamps**. Get them at auto and hardware stores.

Spring clamps

Cross-locking tweezers. Medical **hemostats**. These versions of spring clamps exert tremendous holding force. I use mine when soldering or to hold pieces together when using adhesives. It's nice to have a pair or two around the studio.

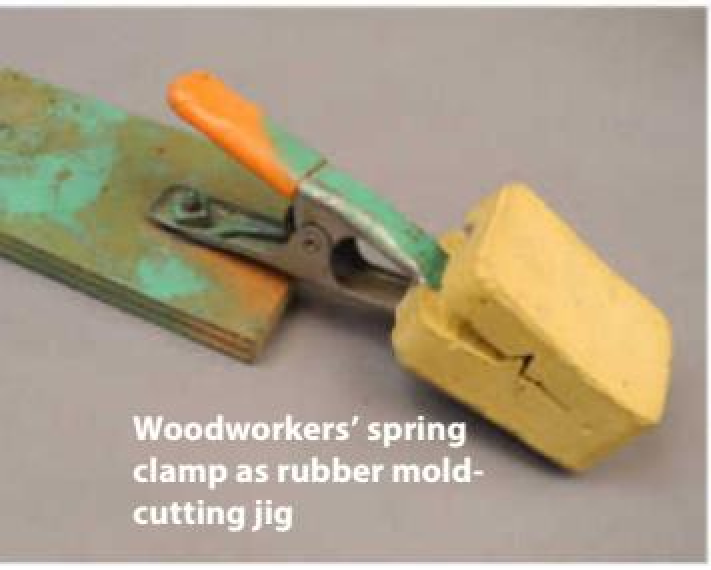
The most common spring clamp is the **woodworkers' spring clamp**. Designed to clamp wood for gluing, they are made of pressed steel and have extremely strong springs. Of interest to those who cast: I made a rubber mold-cutting jig by bolting one arm of a metal spring clamp to a piece of wood. Whenever I need to use it, I use a C-clamp to mount it to my bench. You can also find them made from resin. I bought a dozen **light-duty plastic spring clamps** when they were on sale at one of the major hardware-store chains. They're great for holding delicate materials.

Toggle clamps

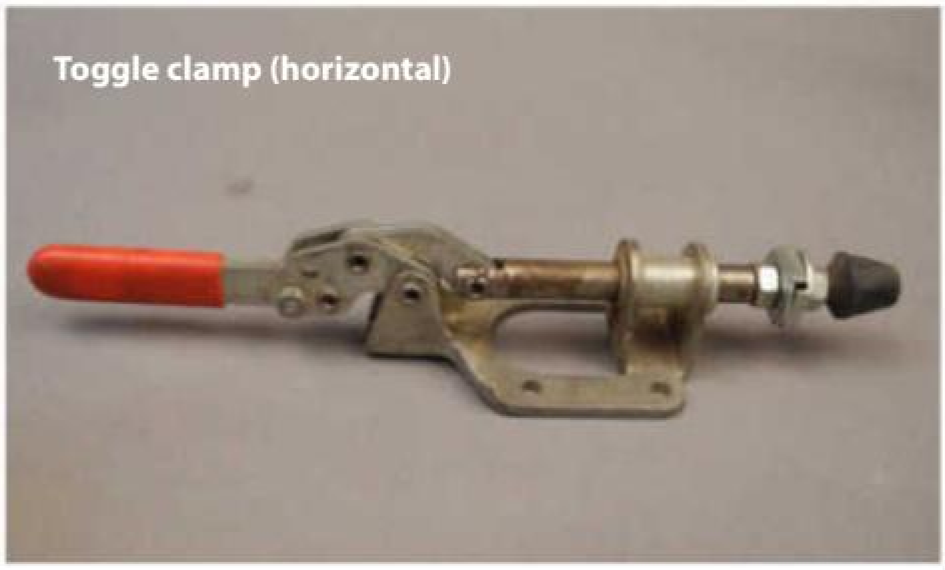
Now, you may have never heard of this clamp. **Toggle clamps** use levers to adjust and apply force to an object to hold it in place. Unless you need to hold something down multiple times and in the same place, you might not need a toggle clamp. But, they're interesting mechanisms. You buy the toggle — just the toggle. It's not a ready-to-use tool, so you need to make a jig out of wood onto which you mount the toggle. It's fully customized for the specific end use. They are available in styles to exert vertical or horizontal pressure, as well as push/pull. The few times I've had to make a jig for using a toggle clamp, it was time well spent.

I like to find a quote or some reference from a famous person to end my articles, but C-clamps don't exactly inspire poems or inspirational words. However, I did find a quote about the hand from a rather smart and well-respected person: Isaac Newton. "In the absence of any other proof, the thumb alone would convince me of God's existence."

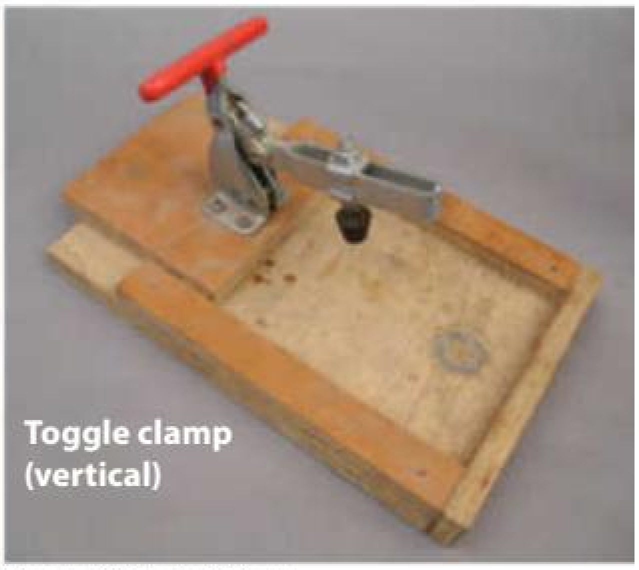
*Christopher C. Darway can be reached via email at **cdarway@outlook.com**.*



Woodworkers' spring clamp as rubber mold-cutting jig



Toggle clamp (horizontal)



Toggle clamp (vertical)

Photos by Christopher C. Darway.

Spotlight on Education

The Dynamic of Transmission and Reception

by Michael David Sturlin

Transmission and reception sounds technical, but don't let that be off-putting. This pair of words is perfect to illustrate a simple point: The transmission and reception of knowledge is like a radio or television broadcast; it takes both a means of projecting the content and a device for receiving the signal in order for the transmission to be complete.

We all start by learning

Here's what I know about learning: It is a neverending activity that will (or should) continue for your entire life, no matter how long your life may be.

Learning is a natural part of our existence as living creatures. Every day we learn something new, no matter how small or seemingly insignificant. Often, we don't even pay attention to what we've learned, unless it's one of those "Ah ha!" moments or it has immediate relevance.

Humans are not born with pre-existing knowledge. Every single thing we do, from childhood to maturity, is something we are able to do because we have learned to do it. All of our technical skills are practiced behavior. Talent is an acquisition, not a birthright. Learning to do something and practicing it diligently leads to a person being talented at that particular activity. Talent is the development of refined knowledge; it is the result of an intentional investment of time and effort.

Knowledge is content

Sometimes we speak about a "body" of knowledge. This is a fitting analogy, because knowledge is like an ocean — a nearly endless body of water. The further we venture away from the shore, the more clearly we recognize the vastness of the expanse of water. Being aware of that limitlessness is important to gaining perspective on learning. Personally, the more I realize how much I've learned about anything, the more I realize how much more there is to learn about everything.

How we learn

Most learning happens through discovery. That discovery can be either intentional or inadvertent; often, the learning process is some of each. Remember that learning is basically the activity of investigation and discovery. Rather than "trial and error," I prefer "trial and realization." And yes, at times, the realization is that what you've tried isn't the best way to do something.

What it takes to learn

An old adage advises that in order to learn something new, you must let go of what you already know, or what you *think* you already know. I've experienced the truth of this from both sides of the bench — in my own pursuit of education and in my work transmitting knowledge to others.

My wife, Praparat, is also a teacher, in the field of culinary arts. She has a large white board on one wall of her classroom, and she begins each class by saying, "Make yourselves like this white board — erase what you already know so you'll be opened up to learn what I have to teach you."

In order to learn, a person must be able and willing to do several things:

- Pay attention
- Focus
- Practice
- Review
- Correct
- Continue to practice
- Analyze
- Make adjustments
- Practice more

You may have noticed a theme — I hope you did! Regular, sustained practice is essential to learning anything and retaining that knowledge over the long term. If you've ever "crammed" for an exam, you'll know how little of the information you retained after the exam was done. Learning a physical skill or craft works the same way. If you try to learn it quickly, you won't retain it over the long term.

Styles of learning

We receive information through our whole range of sensory perceptions: sight, touch, sound, smell, etc. This makes us receptive to different methods of processing, adapting, and incorporating information into useful applications.

Auditory perception

Yes, we receive information by hearing it spoken. But the importance of auditory perception to learning applied techniques goes beyond the instructor's spoken directions. Pay attention to the sounds of your tools and the sounds your material makes as you manipulate it: These can provide valuable information.

Observational perception

We also receive information by watching others. Whether in person or through broadcast media, we visually perceive the process, seeing the movements of tools and their effect on the material. There's a reason that demonstrations are a key part of any classroom session, and that video demos are so popular on the Internet — they work.

Tactile perception

Actually getting your hands on the tools and feeling the manipulation of the material is a vital part of learning. In applied arts, this is generally the most important sensory relationship in perception and practice; the eyes guide and oversee the activity, but the hands and fingers do the actual work.

It is by touching the tools and feeling the result that you gain understanding of cause and effect and develop confidence and skill. In many crafts it is said, "You have to feel it to know it."

Experiential perception

Information is accumulated and processed from any or all of the above. Experiential perception is the culmination of processing all available sensory perceptions into a body of knowledge.

Cumulative awareness

Whether learning through in-person encounters, reading books and magazines, watching videos, or even self-guided experimentation, we are essentially gathering information that we can use and apply and further develop through our own, individual experience.

What it takes to teach

Proficiency is vital, but it takes more than that to be a good teacher. You must also understand the processes well enough to be able to explain them to others, and be able to transmit information clearly and effectively. The teacher should be able to not only show how something is done, but also to explain why.

Often, a workshop student will ask, "How are you doing that?" I respond by saying, "I am going to show you how I am holding/using the tool, but more importantly, I will tell you *why* I am doing it this way." Being able to explain why a tool is held or used a certain way, and why a material responds or a process occurs, is what differentiates demonstrating something from teaching how to do it.

In order to be a good transmitter, a teacher needs to be:

- Skilled
- Confident
- Organized
- Focused
- Well prepared
- Receptive to questions
- Able to provide answers

If teachers don't have an answer, they need to know where to suggest their students might look for the information.

Teachers also must be attentive to a student's individual needs and sensitive to their self-imposed limitations. At the beginning of learning anything new, there's generally some degree of trepidation, which leads to hesitancy. In metals and other visual arts, there's usually a new tool or hand position that is uncomfortable until the student understands the how and why and acclimates to its use. A good teacher needs to be able to encourage students, reassure them, help them recognize the first glimmer of success, and transform that into the beginning of confidence. More than anything, a teacher is a facilitator and enabler — in a good way.

Why teach?

The teacher is the consulting engineer who enables the student to build a bridge to span the chasm between where they are and where they want to go. Teaching is also dedication to the perpetuation of knowledge; it is what keeps that vast ocean of information from receding and drying up.

In the interest of full disclosure, I will mention that I did not set out to be a teacher. I spent 30 years as a professional goldsmith; teaching is my "Act II" in life. It is a path that found me, not one I sought, but it is the one I am traveling at this point in my career.

Although I wasn't formally trained as an educator, the body of knowledge I acquired in my studio practice gave me a good understanding of cause and effect and enabled me to effectively transmit process and technique. I am delighted to be able to share that experience with others and help them move forward on their own path of creative expression.

Teaching and learning go hand in hand. When instructing others, the teacher will inevitably also learn new things. I've found that the more I teach, the more I learn. Not only about the topic I'm teaching, but about the activity of teaching itself.

I have my peers and teachers to thank for helping me develop as a practitioner, and I have my students to thank for helping me develop as a teacher. I also have a very special colleague to thank — my late friend Sigrid Schneider, a fellow teacher and goldsmith from Vienna. Sigrid encouraged me toward my Act II with the observation that, "The main reason to teach is because nothing else can ever be as fulfilling." AJ

Michael David Sturlin is an award-winning goldsmith, jewelry artist, and educator. Contact him via email at michaelsturlinstudio@cox.net.

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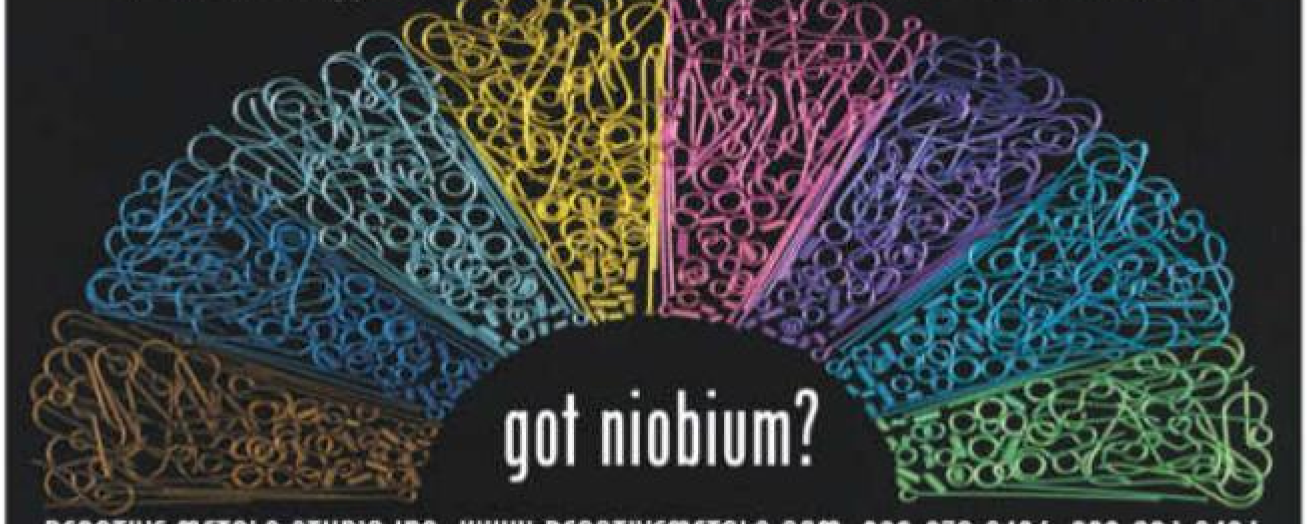

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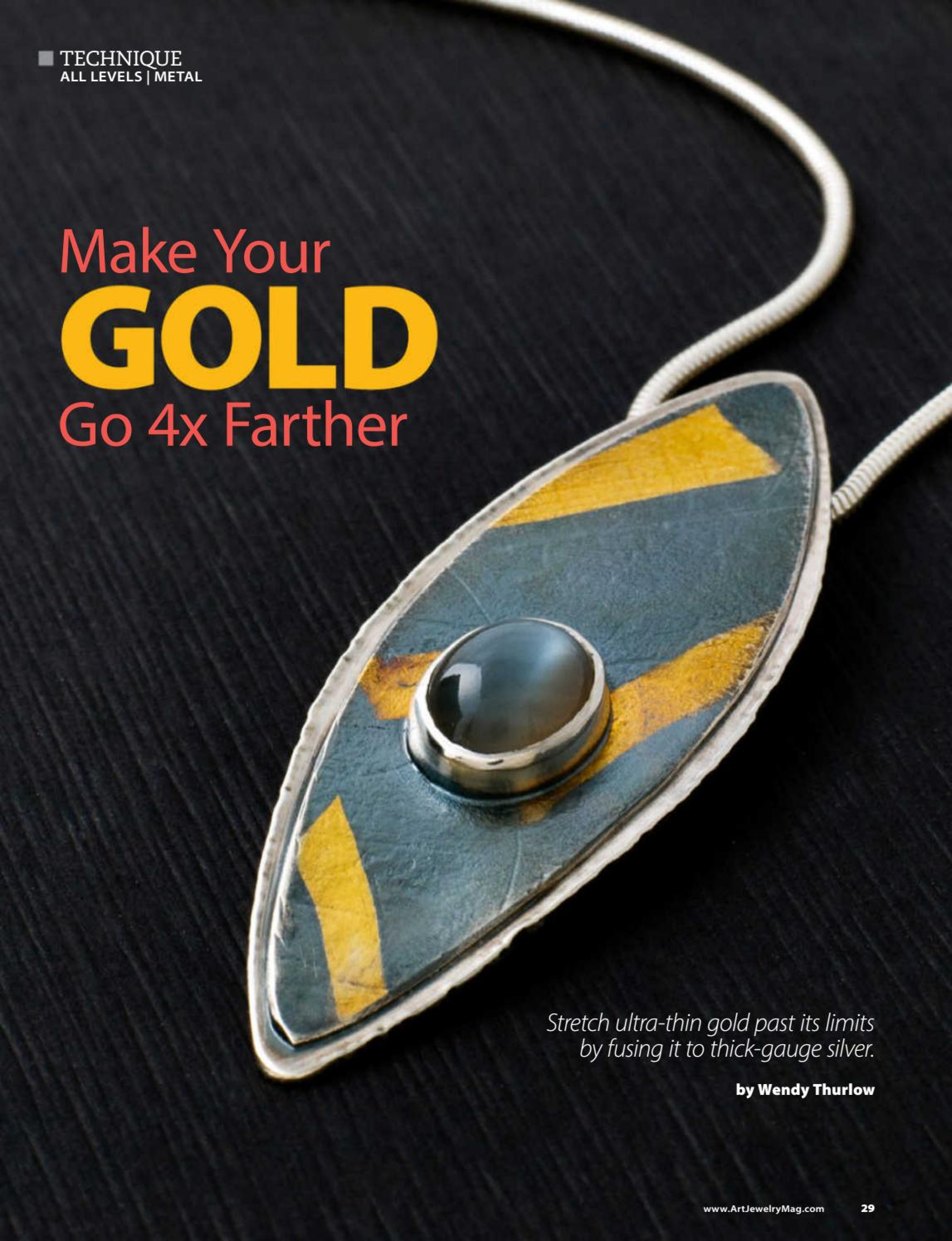

Make Your GOLD Go 4x Farther

Stretch ultra-thin gold past its limits by fusing it to thick-gauge silver.

by Wendy Thurlow

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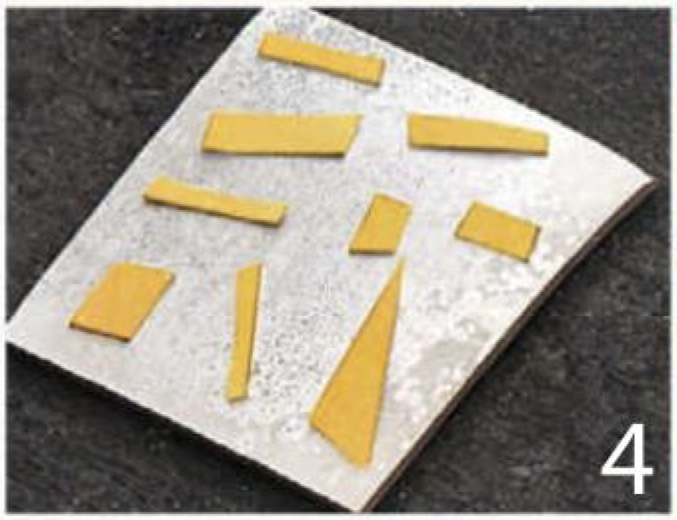
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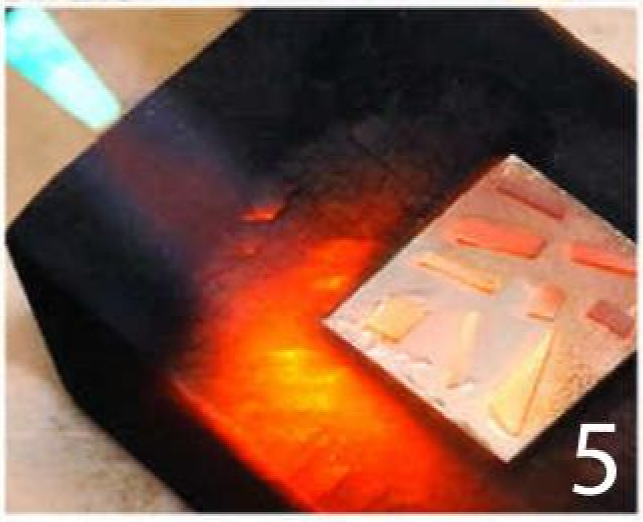
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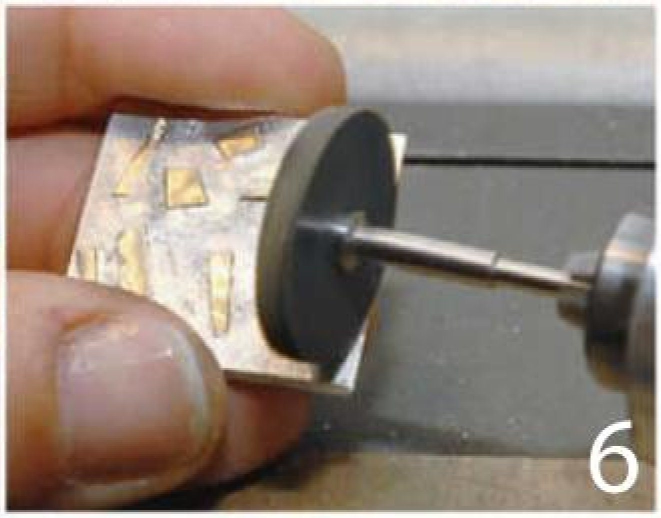
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materials

- Sterling silver sheet:
  - 14-gauge (1.6 mm), 1 x 1 in. (25.5 x 25.5 mm)
  - 22-gauge (0.6 mm), amount determined by design (optional)
- 24k-gold sheet: 34-gauge (0.16 mm), amount determined by design

toolboxes, page 77

- Soldering/Annealing
- Finishing

additional tools & supplies

- Shears
- Steel bench block
- European dead-blow or rawhide mallet
- Cotton swab
- Rubbing alcohol
- Silicone medium-grit polishing wheel with a flex shaft or rotary tool (optional)
- Needle
- Agate burnisher
- Rolling mill
- Textured fabric or paper (optional)

Find out where to buy supplies, *page 79*
See Safety Basics, *page 76*

See "3 Types of Torch Flames and When to Use Them" for an illustrated look at three different types of flames you can get with a torch.
www.artjewelrymag.com/reference

EXPERIMENTING WITH WAYS TO FUSE SILVER AND GOLD has helped my work evolve. I like to incorporate patterns, asymmetry, and rich, contrasting colors in my work. Fusing allows me to utilize all of these elements in a single sheet of metal. The biggest perk of this technique is how far you can stretch a small amount of gold. By the end of this process, the silver-and-gold sheet will be nearly four times its starting size! This is a great way to get the look of gold for a fraction of the cost. This process is done before fabricating a piece of jewelry, as opposed to keum boo, in which gold accents are applied to a finished piece. This mixed-metal sheet is relatively easy to make and the end result can be used just like a sheet of silver.

Prepare the silver. Place a sheet of heavy-gauge sterling silver on a firebrick or soldering board. I used a 1 x 1-in. (25.5 x 25.5 mm) square of 14-gauge (1.6 mm) sterling silver sheet. Use a bushy flame to heat the silver to a dull red glow. Let the silver air-cool, and then place it in pickle. Let it soak for a few minutes, then remove it from the pickle, rinse it, and dry it; do not use a brass brush yet.

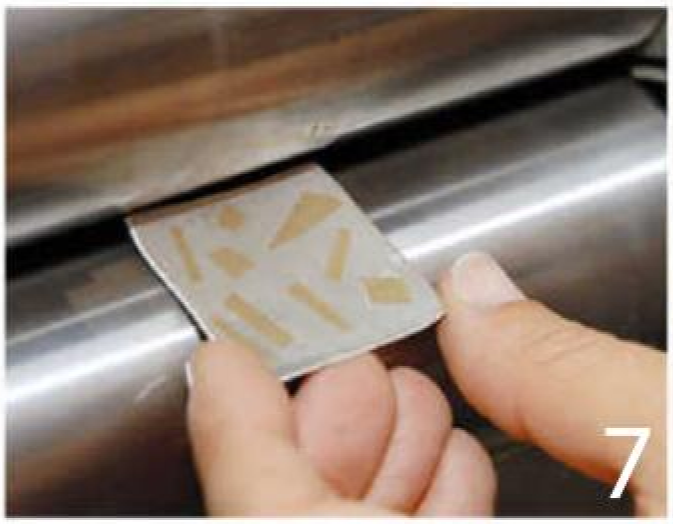
Repeat the heat/pickle/rinse cycle roughly five to seven times. This process creates a slightly porous surface, which helps the gold bond to it during fusing, but it also removes the copper from the surface, leaving behind a top layer of fine silver **[1]**. (See "Depletion Gilding vs. Depletion Silvering," *page 65).*

Set the silver sheet aside.

NOTE: Be sure to hold the silver sheet by its edges after preparing it to keep it clean and free of grease.

Cut out the gold. You can custom-order 24k-gold sheet in 34-gauge (0.16 mm), or you can use your rolling mill to roll down thicker sheets of gold to a thinner gauge. A general rule of thumb is to anneal after reducing the thickness 50%. While rolling out the sheet, if you want to change directions (say, from north/south to east/west), anneal the metal before rotating it, or you risk cracking or tearing it.

Use shears to carefully cut geometric shapes from the 34-gauge (0.16 mm) 24k gold **[2]**. Unlike keum boo, the gold will be distorted by multiple passes through the rolling mill in a few steps, so don't cut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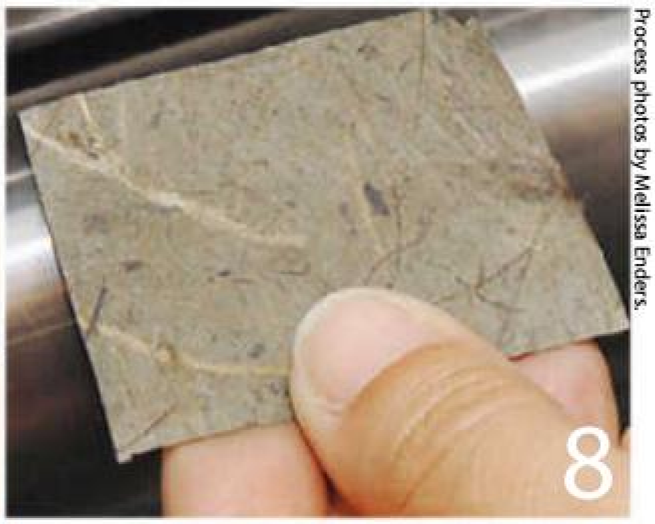
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Process photos by Melissa Enders.

intricate or precise designs that require a distinct edge. Don't worry about the gold shapes being neat or complementary; the gold will lose its distinct edge during the later rolling process.

NOTE: Make sure the silver and the gold shapes are completely flat. Place each piece on a steel bench block one-at-a-time, and use a European dead-blow or rawhide mallet to flatten it. This is important so air bubbles don't form when you fuse the gold to the silver.

Clean the metal. Dip a cotton swab in rubbing alcohol and use it to wipe both sides of your silver sheet and gold shapes **[3]**. This step will remove any grease or dirt that remains on the metal. Allow the alcohol to evaporate from the metal.

Fuse the gold and silver. Place the silver square on a charcoal block.

NOTE: To create a reducing atmosphere (which is best for fusing), work on a charcoal block. The burning charcoal forms carbon dioxide (CO_2), which absorbs oxygen and hinders oxidization of the metal.

Use tweezers to arrange your gold shapes on the silver **[4]**. Again, do not worry about precise placement of the gold shapes; just be sure that the gold doesn't hang over the edges of the silver sheet.

Use a bushy, reducing flame to evenly heat the metal until the silver becomes shiny and mirror-like **[5]**. When there is a bright flash between the gold and the silver, the gold and silver have fused.

NOTE: If the silver overheats, it will flow over the edges of the gold. Don't worry! After the metal cools, use a medium-grit silicone wheel in a flex shaft or rotary tool to remove the overlapping silver **[6]**.

Let the metal air-cool to avoid thermal shock. If quenched while red-hot, sterling silver may crack.

Check for air bubbles. Once the piece is cool, check for air bubbles trapped under the gold. If you find any, use a needle to punch a hole in the center of the bubble. Use an agate burnisher to tap and burnish the bubble flat, working from the edge of the bubble toward the hole. Then reheat the metal to fuse the burnished gold to the silver.

After you remove any air bubbles or silver overflow, place the piece in pickle to remove any oxidation. Let it sit for a few minutes, then rinse it. Check that the gold is fused, with no loose edges, then brush the metal surface with the soapy brass brush to clean it. Dry it well.

Roll the metal. Run the fused sheet through a rolling mill multiple times to compress the gold completely flush to the silver. To get the most out of my gold, I prefer to roll out my 14-gauge (1.6 mm) sheet to 22 or 24 gauge (0.6 or 0.5 mm) **[7]**.

Anneal the sheet as necessary while rolling it down to avoid cracking.

Texture the metal sheet. When you get close to your desired gauge, anneal once more, and then lay a piece of textured fabric or paper on top of the sheet and pass them through the rolling mill together. I find that rice paper adds a beautiful, subtle texture to the metal **[8]**.

NOTE: After rolling down and texturing the fused sheet, sweat-solder a piece of 22-gauge (0.6 mm) silver onto the back to add strength, if desired.

Fabricate your piece. Cut, form, solder, embellish, and finish your fused sheet just as you would a sheet of sterling silver.

BASICS & VIDEOS

Learn fundamental techniques in these bonus tutorials:	B	🎥	
Annealing metal	●	●	
Preparing and using a charcoal block		●	
Pickle basics	●	●	Art+
Using a rolling mill			Art+
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Sweat soldering	●	●	

B **Basics, *page 75***
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ASK THE ARTIST: WENDY THURLOW

What studio mistake has taught you the most?

"A few years ago, I overheated and cracked a pendant I was working on. At first I was horrified, then I realized the crack was quite interesting. I enlarged and refined the crack in the silver, then set a raw ruby within the space. Now I do it on purpose and fill the lines and cracks with gold and gemstones!"

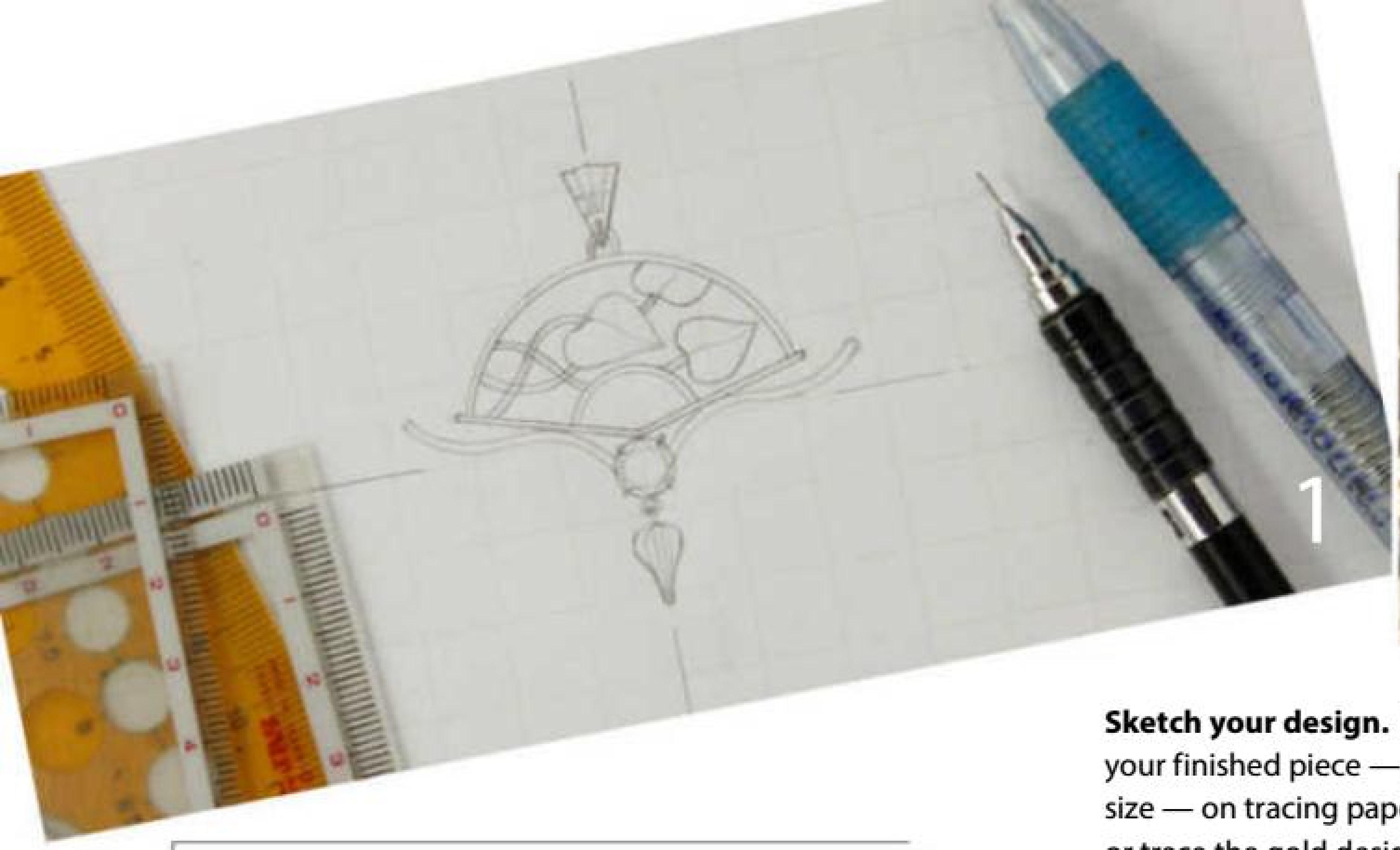
Contact: www.hammeredbywendy.com, hammeredbywendy@gmail.com

Give KEUM BOO more depth without more gold

How do you give applied gold a more substantial look without incurring a more substantial price tag? The secret is in the silver.

by Kazuhiko Ichikawa

Keum boo (pronounced "come boo") is a traditional Korean technique of fusing gold foil directly onto a finished piece of fine silver. My method adds a twist, by first incorporating silver sheet elements before fusing the gold foil. While you can create more depth and dimension in your pieces this way than with gold alone, the heat required for this method is more intense than the traditional technique. With that in mind, plan on using a finished piece that only uses medium or hard solder — joins closed with easy solder will likely reflow during the foil-application steps.



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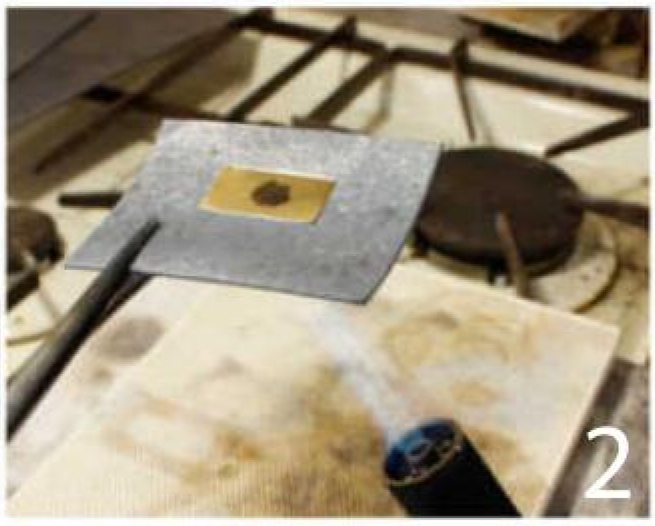

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materials

- Sterling or fine-silver finished piece (stones not set)
- Fine-silver sheet: 24-gauge (0.5 mm), amount determined by design
- Copper sheet: 18-gauge (1.0 mm) copper sheet, large enough to support the gold foil
- 24k gold foil: amount determined by design

toolbox, *page 77*

- Soldering/Annealing

additional tools & supplies

- Tracing paper
- Double-sided tape
- Jeweler's saw with 4/0 or 5/0 blades
- Scissors (optional)
- Cutting mat
- Curved surgical blade and holder
- Insulating compound (optional)
- Gum arabic or tragacanth gum
- Agate burnisher
- Sewing needle

Find out where to buy supplies, *page 79*
See Safety Basics, *page 76*

BASICS & VIDEOS

Learn fundamental techniques in these bonus tutorials:	B	🎥	
Annealing metal	●	●	
Pickle basics	●	●	
Using shears to cut metal			Art+
How to fuse fine-silver sheet			Art+

B Basics, *page 75*
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Sketch your design. Draw your finished piece — actual size — on tracing paper. Sketch or trace the gold design you'll be adding to it **[1]**. The design will determine how much fine-silver sheet and gold foil you will need.

Anneal the silver sheet and gold foil. Use a permanent marker to carefully color a piece of gold foil. Set a sheet of 18-gauge (1.0 mm) copper on a tripod, and heat it with a torch to oxidize its surface. Place the gold on the oxidized copper. The oxidation will prevent the gold from fusing with the copper. Directing the flame from below, evenly heat the copper; it will transfer heat to the gold **[2]**. Continue until the marker on the gold disappears.

EDITOR'S NOTE: The gold foil Ichikawa uses is substantially thicker than the gold foil that is readily available in the United States. You can achieve a similar look by either adding layers of thinner gold foil or using a rolling mill to roll out a 24k-gold sheet until it's the same thickness as his (0.05 mm/ 50 microns).

Use a permanent marker to color the 24-gauge (0.5 mm) fine-silver sheet. Either set the fine silver on the copper sheet used to anneal the gold, or place it on a soldering board. Heat the silver evenly until the marker disappears.

Transfer your design and cut out the fine-silver sheet. Use double-sided tape (film-based, not fabric or paper) to secure the sketched design to the annealed fine-silver sheet. Use shears or a jeweler's saw with a 4/0 or 5/0 blade to cut out the fine-silver embellishments **[3]**. If needed, use a file to refine the edges.

Cut the gold foil. The gold foil is much too thin to cut with a saw. Depending on the thickness of the foil, either place it between two sheets of tracing paper and cut it with scissors, or place it on a cutting mat and use a craft or surgical knife instead. If needed, use the fine-silver embellishments as a guide for cutting the foil.

TIP: When using a craft or surgical knife to cut gold foil, place the foil on a cutting mat. Gently but firmly push the blade through the foil. Cut little by little. If you have a surgical blade, cut with the curve of the blade and use a rocking motion. Do not move quickly, or you'll "drag" the foil at the cut and tear it.

If you use a craft or surgical knife, the cut edge of the foil will be slightly raised as a result of the blade pushing through the foil to cut it. Place the foil on a steel bench block,

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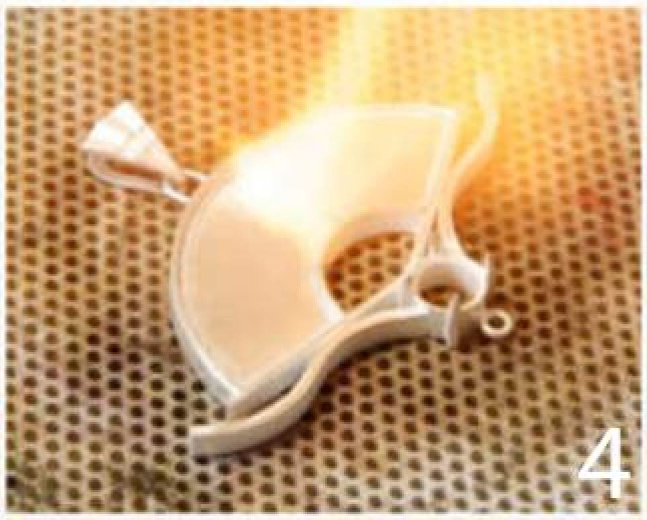
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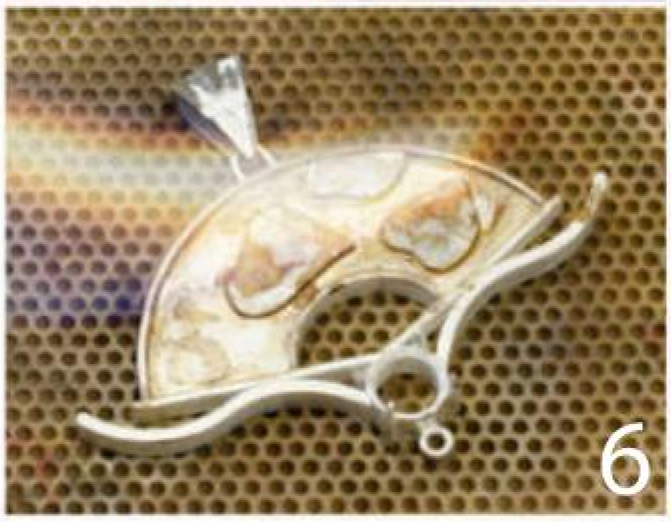
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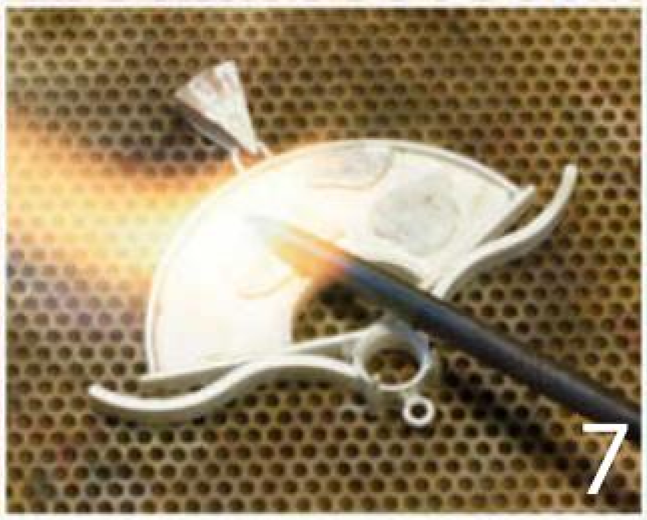
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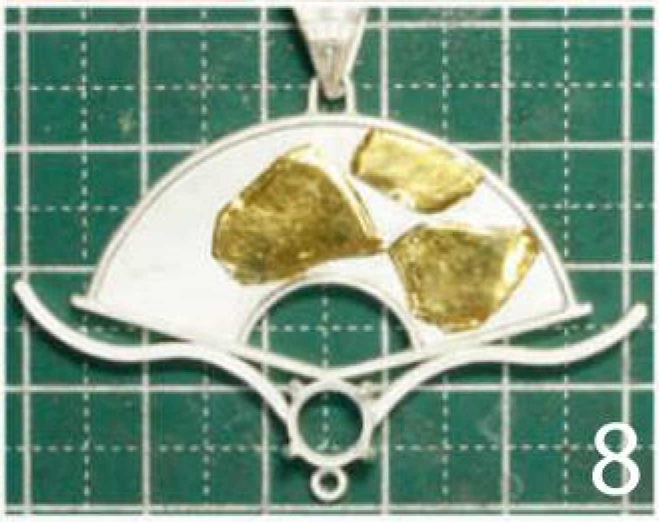
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with the raised edge facing up. Use a burnisher to gently smooth down this ridge.

Prepare the finished piece. Remove copper from the surface of your finished sterling silver piece and leave a fine-silver surface by using a technique known as "depletion silvering." (See "Depletion Gilding vs. Depletion Silvering," *page 65*.) Light your torch and use a soft, bushy flame to heat your piece **[4]** until the sterling silver darkens from oxidization. Quench, pickle, rinse, and dry the piece.

Repeat this process several times until the sterling silver no longer oxidizes.

Adhere the fine-silver sheet to the piece. Dissolve a small amount of gum arabic or tragacanth gum in distilled water **[5]**. A little of the powder goes a long way: Start with ½ tsp (2.46 mL) or less, and slowly stir in water. The solution should be smooth and transparent, not a sticky gel.

Use tweezers to dip the fine-silver embellishments into the solution and then set them in place on the finished piece. Allow the gum solution to dry. You can speed up the drying process by using a hair dryer, but be careful not to blow away any small silver pieces!

The 24-gauge (0.5 mm) sheet is too thick to be held in place by the gum solution. That's all right — the solution's purpose is as a temperature indicator, not as a glue. Don't clean up any excess solution.

Fuse the silver sheet. Use a soft, bushy flame to heat the piece. As the temperature rises, the excess gum solution will scorch black **[6]**. Continue heating until the scorch marks disappear. Then, while keeping the flame on the piece, use a steel burnisher to burnish the fine-silver embellishments. Press the burnisher down at the center of a fine-silver piece, and then roll it outward to drive out any trapped air **[7]**.

NOTE: Because we are using a thicker gauge of metal than is used in traditional keum boo, you'll need to push harder with the burnisher and apply the heat for a bit longer. Be patient, but take care not to overheat the piece, or any previous solder joins could reflow.

After you have fused all the fine-silver embellishments, remove the flame. Check to make sure all the fine-silver pieces are affixed from edge to edge. Let the piece air cool.

Polish the fine-silver embellishments. Use 800–1000-grit sandpaper to remove any stray marks left by the burnisher, and refine the surface.

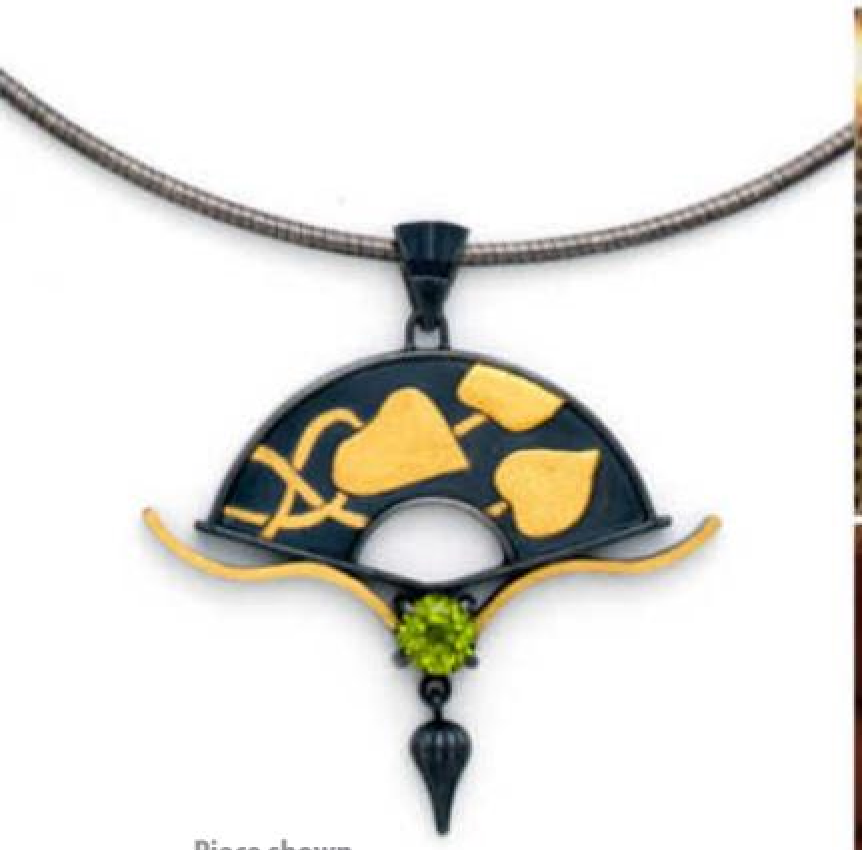
Adhere the gold foil. This step is much like traditional keum boo. Dip each piece of gold foil in the gum solution, and place it on top of its corresponding fused fine-silver embellishment **[8]**. Just as before, once the solution is dry, heat the piece with a soft, bushy flame, burning off the gum solution.

EDITOR'S NOTE: For Ichikawa's method, torch control is key. When fusing the gold foil, use a big, bushy flame and keep the flame moving to maintain temperature and

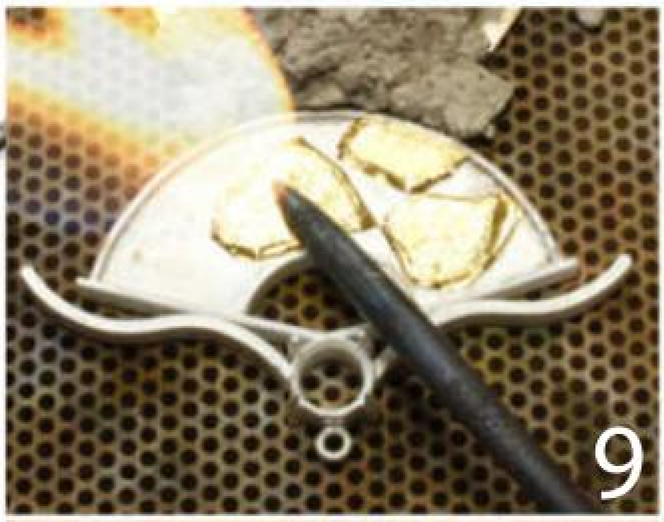
no torch? no problem!

I will occasionally swap out my torch with a sheet of 12-gauge (2.1 mm) copper over the burner of my (gas) kitchen stove. Using the stove means that both of my hands are free, which makes it easy to hold and burnish the foil. I use this method when the piece is flat and the area in contact with the copper is conveying enough heat.

A hotplate will also work to fuse gold foil to fine silver. If you use an electric hotplate, make sure it's stable and can reach temperatures of 500–800°F (260–427°C).



Piece shown actual size



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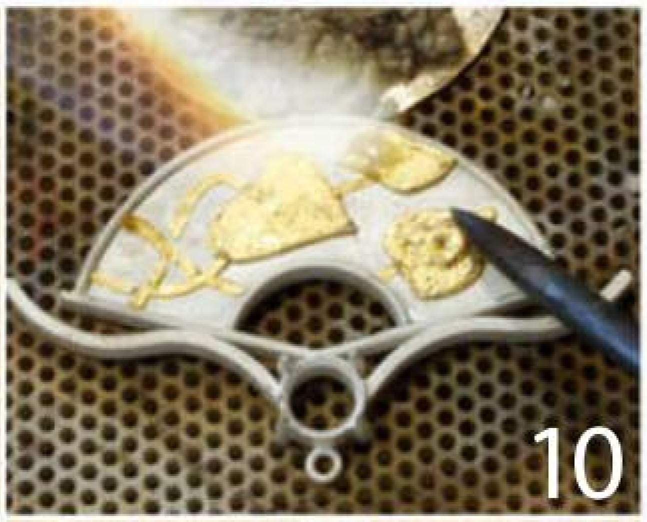

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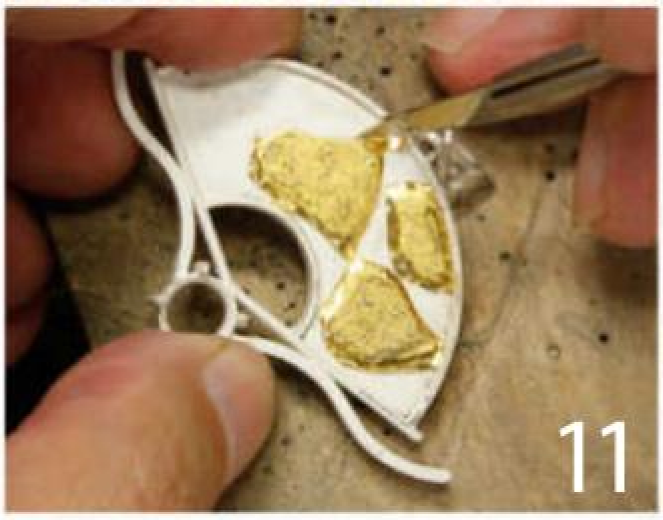

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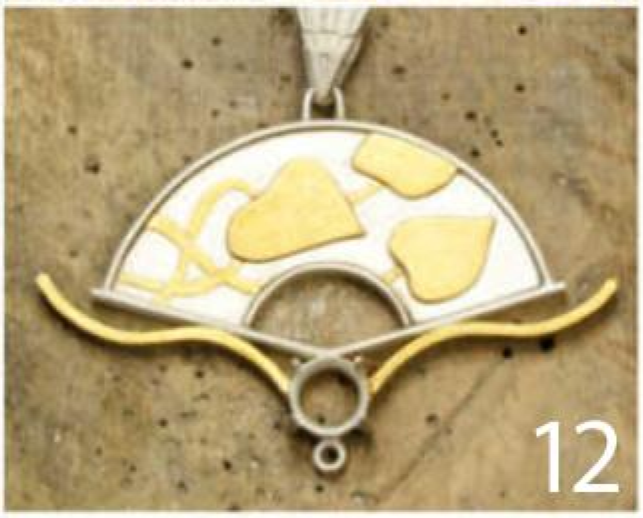

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Process photos by Kazuhiko Ichikawa.

not overheat the piece. You can also use a hotplate or your stove for this step (see "No Torch? No Problem," *page 35*).

Continue heating until the scorch marks from the solution disappear. After they disappear, use a burnisher to burnish the foil **[9]**.

NOTE: Because this technique generates a lot of heat, you may be concerned for some of your more delicate joins or a vulnerable portion of your finished piece (like the bail on my pendant). If that is the case, you can use an insulating compound, such as Heat Shield. This clay-like heat sink acts as a barrier between delicate stones, metal parts, or joins, and the flame. Most compounds can be washed away with water.

Starting at the center of the foil, push the burnisher down into the foil and then roll it outward to drive out any air trapped under the foil.

NOTE: To remove any trapped air, remove the flame and use a needle to poke a release hole in the center of the air bubble. Return the flame, and burnish the air bubble. Start at the outside edge of the bubble and work in toward the hole to release the air **[10]**.

Allow the piece to air cool.

Finish the gold. Use the craft or surgical knife to trim the gold foil along the edge of the fine-silver embellishment **[11]**. Use a medium silicone point in a flex shaft or rotary tool to refine the edge of the gold.

Depending on the thickness of your foil, you can add texture, or just lightly polish the gold with 800–1000-grit sandpaper to remove any remaining tool marks.

Finish the piece. If you like, you can add more gold elements to your piece using the more traditional keum boo method. For this method, heat the piece on a hotplate or stovetop, and apply the gold foil directly on the depletion-silvered surface of the sterling silver piece. It will give you a flatter look — and mixing the traditional keum boo with my method of layering silver gives you more depth in your design.

For my piece (*page 32 and above left*), I used traditional keum boo to add stems to the leaves and to add gold to the framing tendrils below the main body of the pendant **[12]**.

Finish your piece as you desire. I like to use a liver of sulfur patinate to increase the contrast between the silver and gold. As the last step, set any stones. AJ

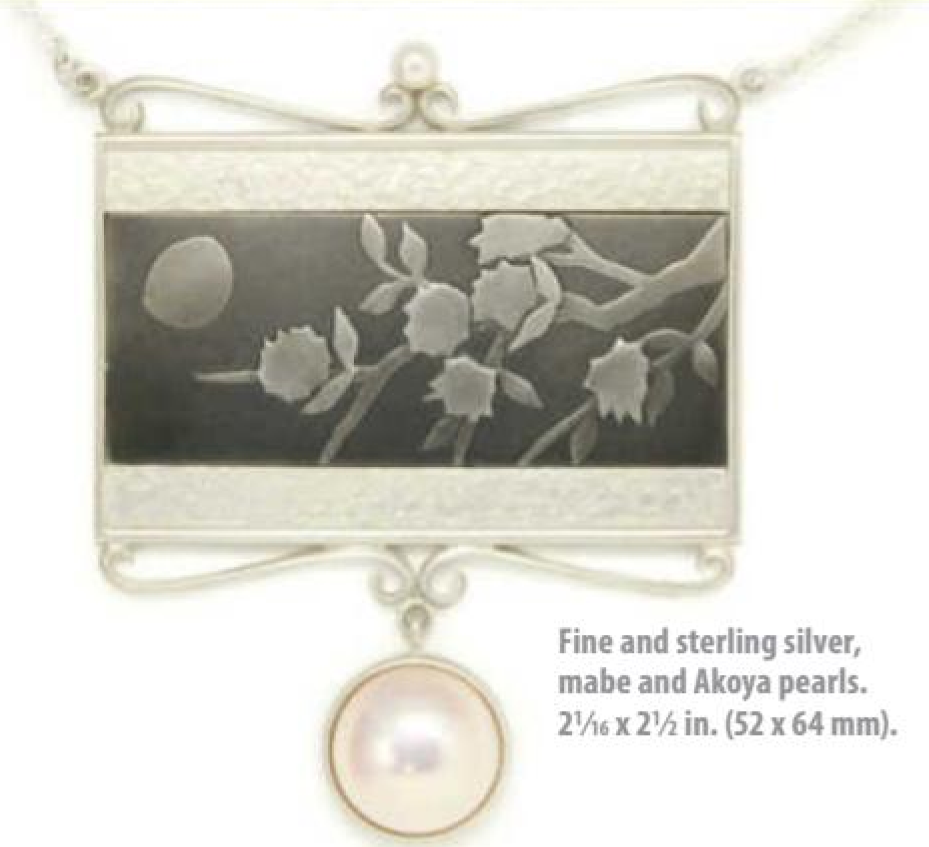
ASK THE ARTIST: KAZUHIKO ICHIKAWA

What studio mistake have you learned the most from?

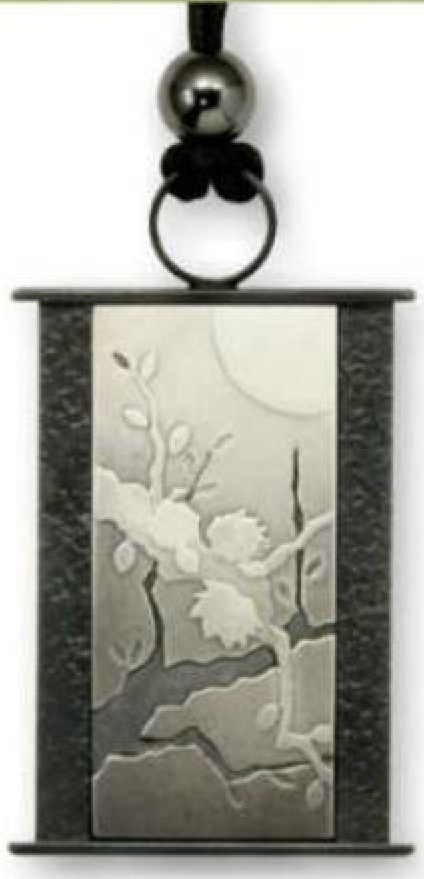
"There are many, but I learned early on to never solder sitting on a chair. I dropped a heated ring on my lap. Now my soldering section of the studio is a standing setup — no chairs."

Contact: tanzanite1837@yahoo.co.jp or www.etsy.com/shop/kaznesq

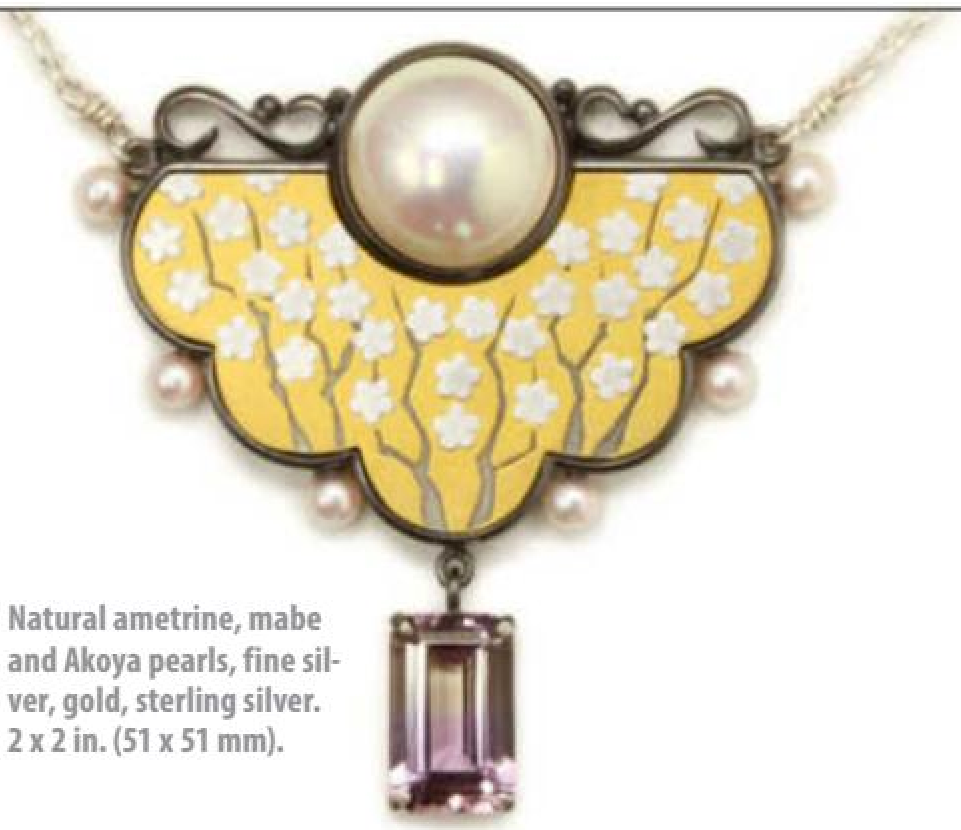
Gallery: Kazuhiko Ichikawa



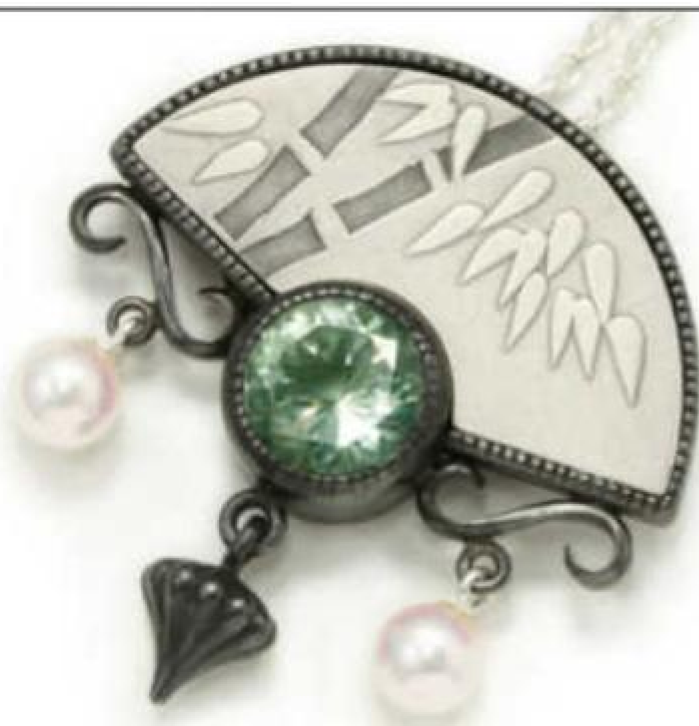
Fine and sterling silver, mabe and Akoya pearls. 2 1/16 x 2½ in. (52 x 64 mm).



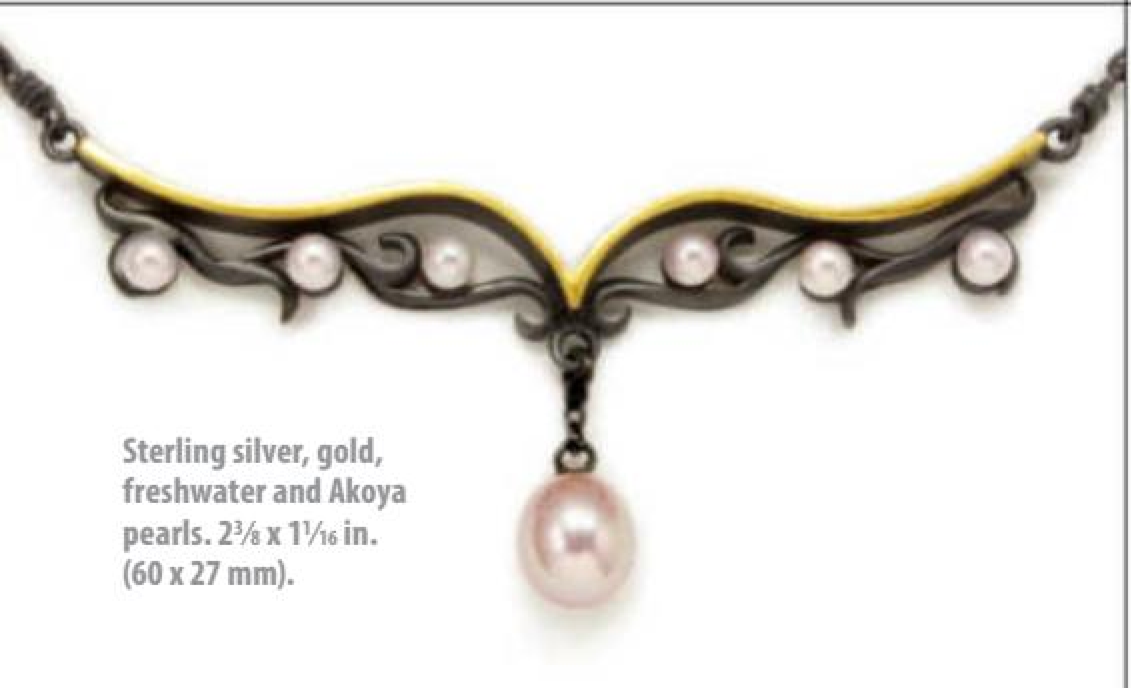
Fine and sterling silver, hematite bead, and cloth cord. 1⅜ x 2¼ in. (34 x 57 mm).



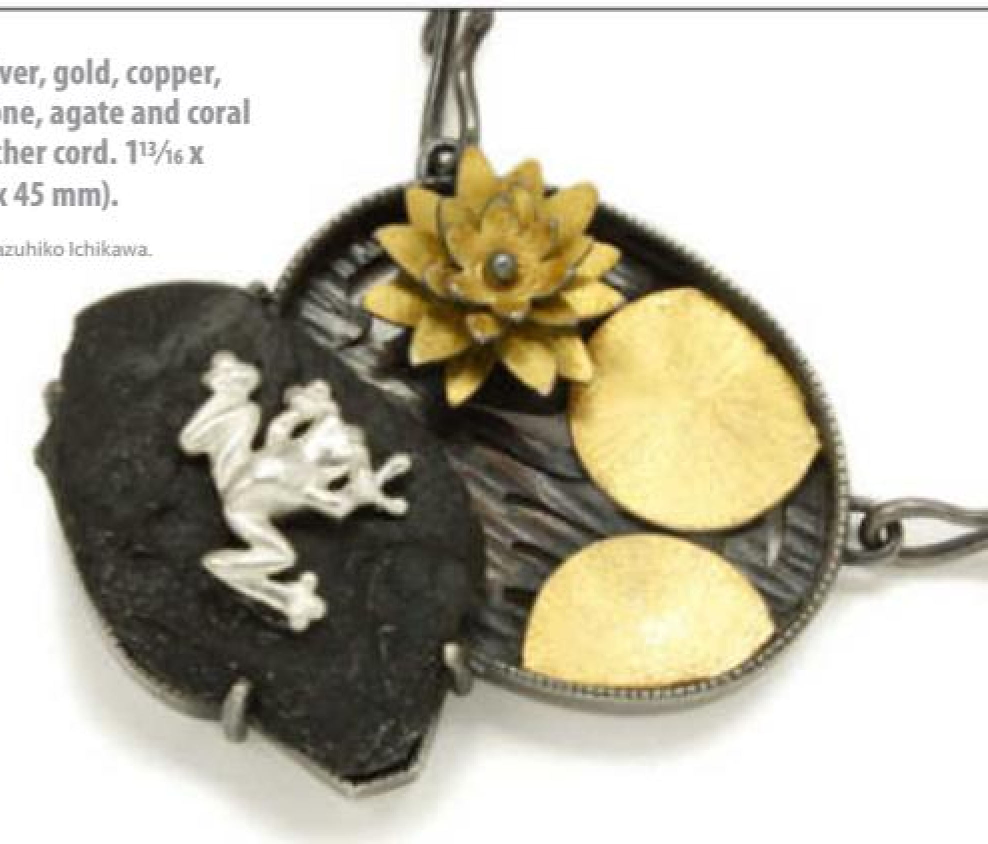
Natural ametrine, mabe and Akoya pearls, fine silver, gold, sterling silver. 2 x 2 in. (51 x 51 mm).



Fine and sterling silver, green amethyst, and Akoya pearls. 1⅜ x 1½ in. (35 x 38 mm).



Sterling silver, gold, freshwater and Akoya pearls. 2⅜ x 1 1/16 in. (60 x 27 mm).

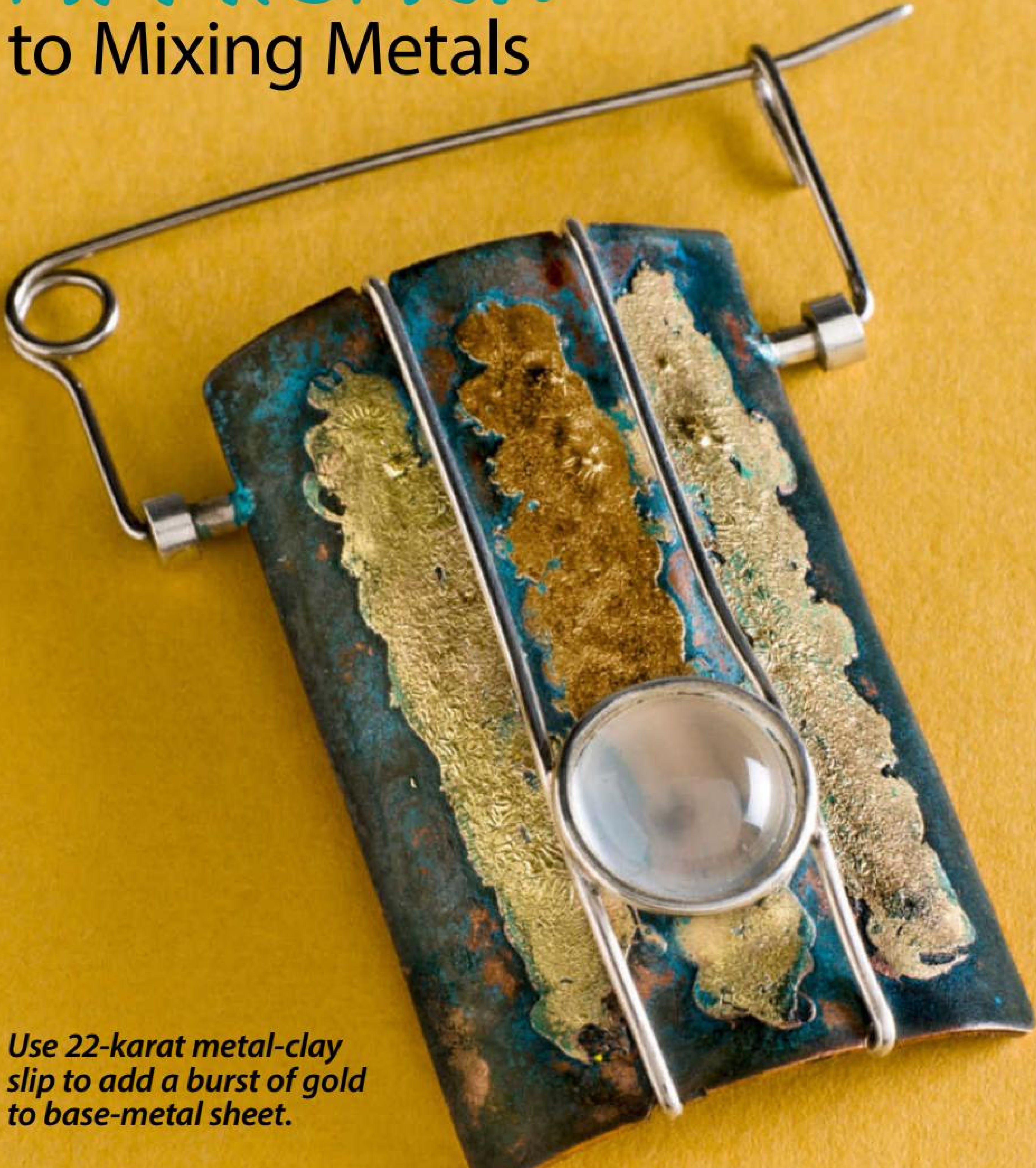


Sterling silver, gold, copper, natural stone, agate and coral beads, leather cord. 1 13/16 x 1¾ in. (46 x 45 mm).

All photos by Kazuhiko Ichikawa.

■ TECHNIQUE
ALL LEVELS | METAL/METAL CLAY

Take a PAINTERLY APPROACH to Mixing Metals



Use 22-karat metal-clay slip to add a burst of gold to base-metal sheet.

by Christopher C. Darway

You say the word "gold," and most people think, "jewelry." Gold rings, gold torques, a glowing array of solid gold wearable pieces. But there are different ways to create the look of solid gold or gold accents without the high cost, including gold plating, Korean keum boo, traditional gold leaf, fusing, and mercury gilding. (I've never tried mercury gilding, and for good reason — I want to live a few more years. It was outlawed in France in 1830.) Aura 22, a gold metal-clay slip, is a relatively new way to add gold to fine silver, sterling silver, and copper.

The technique of applying Aura 22 to copper is simple, uses no expensive or exotic equipment, and is safe. If applied and fired properly, the finished sheet can be etched, soldered, enameled, mill rolled, and fold formed.

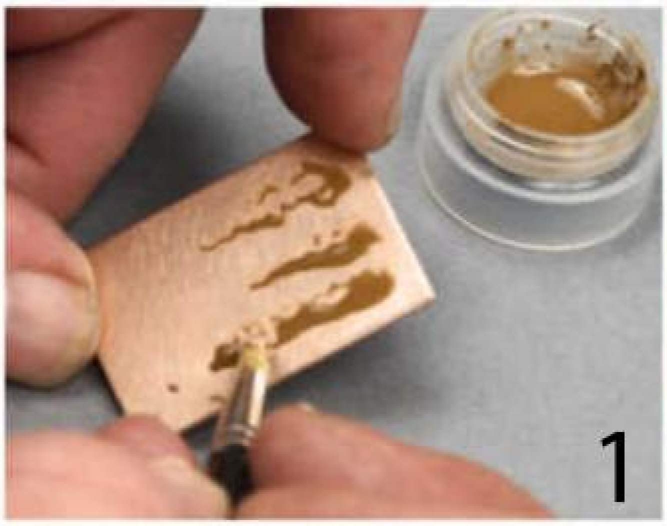
materials

- Copper: 16–24-gauge (1.3–0.5 mm), amount determined by design
- Aura 22 with media or distilled water

tools & supplies

- Scouring pad
- Paper towel
- Rubber-tipped clay shaper
- Mug warmer
- Firebrick and broken charcoal blocks, or a new charcoal block
- Tweezers
- Candle
- Torch
- Quench bowl
- Pickle pot with pickle
- Soft brass brush
- Packing tape
- Super pickle (hydrogen peroxide, sodium bisulfate)

Find out where to buy supplies, *page 79*
See Safety Basics, *page 76*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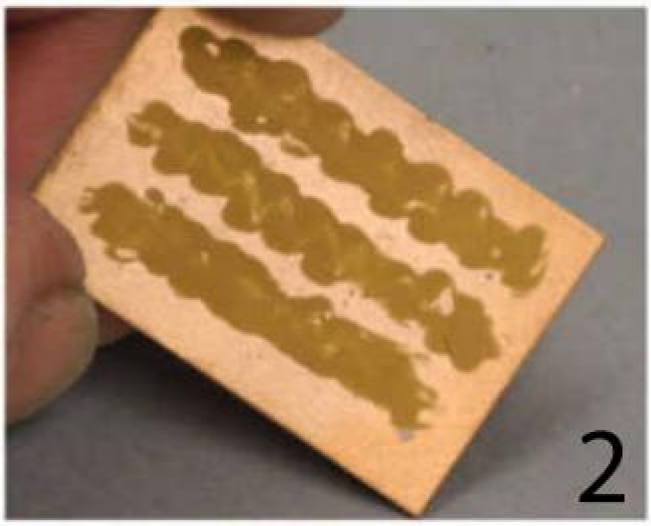
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What is Aura 22?

Aura 22 is a mixture of 91.6% powdered 24k gold, 8.4% fine silver, and a water-based, nontoxic binder. When it's fired, the alloy tests to 22k gold. One advantage of Aura 22 over traditional keum boo is that the gold is painted onto the metal, rather than burnished, allowing it to reach into recessed areas.

NOTE: Aura 22 is a PMC product. Accent Gold for Silver is made by Jewelry Material Innovation, Inc. Accent Gold is 24k gold and can be torch-fired on sterling or fine silver; if using sterling silver, you first must raise the fine silver (see "Depletion Gilding vs. Depletion Silvering," *page 65*).

Preparation

Prepare the copper. Use a scouring pad to clean both sides of a piece of copper (see "Size Limitations," *page 41*), then rinse the metal in water. Water should sheet off the surface, not bead up. If it beads up, scrub the copper again. Use a paper towel to pat the copper dry, and handle it only by its edges from this point on. No greasy fingerprints! Set the copper aside.

Prepare the Aura 22. Open a package of Aura 22. Remove and carefully open the plastic jar. Depending on the orientation of the package during transport and storage, there might be an accumulation of gold and liquid binder in the cap. Use a rubber-tipped tool, such as a clay shaper, to scrape the excess material out of the cap and back into the jar. Carefully stir the mixture to mix the liquid binder and gold particles into a creamy consistency. If it's dry, use the included media to reconstitute it. I've also used distilled water for this with no adverse effects.

Apply the Aura 22. Use the rubber-tipped clay shaper to apply Aura 22 to the freshly cleaned copper **[1]**. I like to rub the tool back and forth to give the gold a natural edge. One coat is enough for sufficient coverage, but if you want a more dimensional look, apply a second coat after the first is dry.

Set the copper on a mug warmer until the Aura 22 is dry **[2]**. Yes, the manufacturer's instructions say not to, but I've never noticed any difference whether it's force-dried or air dried.

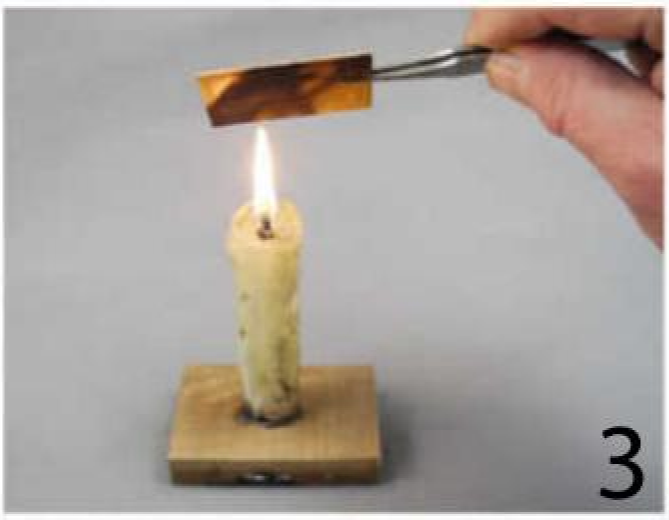
TIP: Let any excess Aura 22 on a rubber-tipped shaping tool dry there. Once it's dry, peel it off and return it to the jar.

Prepare the firing surface. Aura 22 is meant to be applied to fine silver because fine silver doesn't produce oxides when fired in a kiln or with a torch. When using it on copper, you must create a reducing atmosphere to prevent the copper from oxidizing and interfering with the gold's ability to bond to it.

The most commonly available surface for this is a fresh charcoal block, but I like to use a spongy firebrick charged with charcoal. The center where I taught never

Learn how to use pickle in "Basics," *page 75*, and watch a demo video at www.artjewelrymag.com/videos.

Subscribers: See the three types of torch flames and when to use them at **www.artjewelrymag.com/reference**.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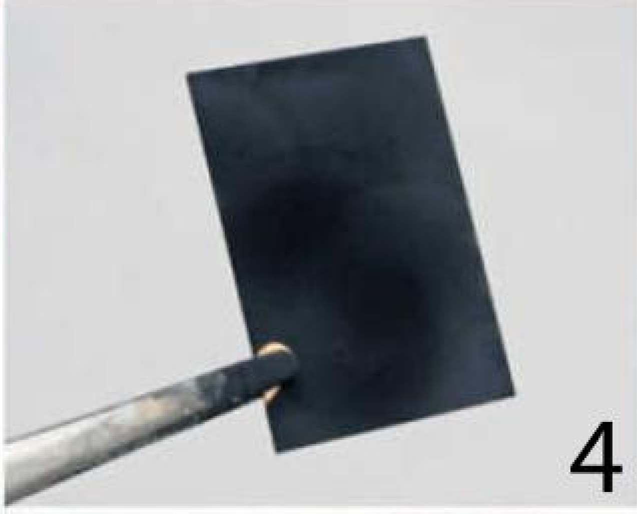
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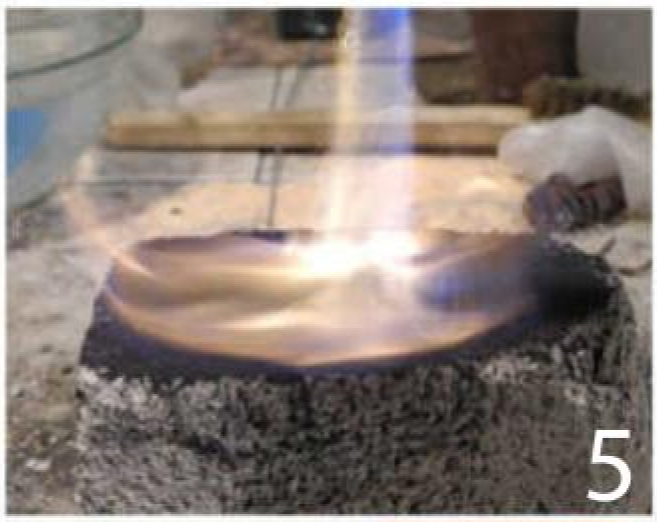
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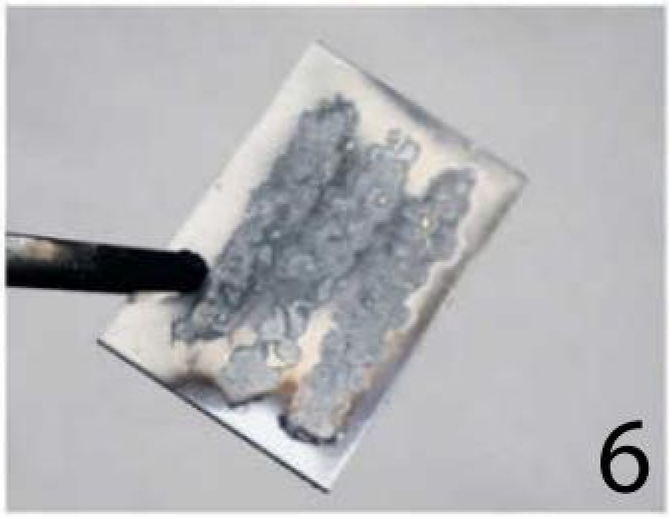
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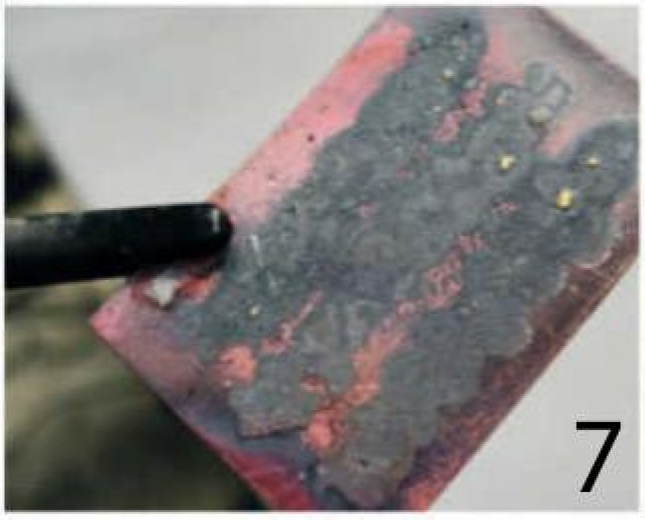
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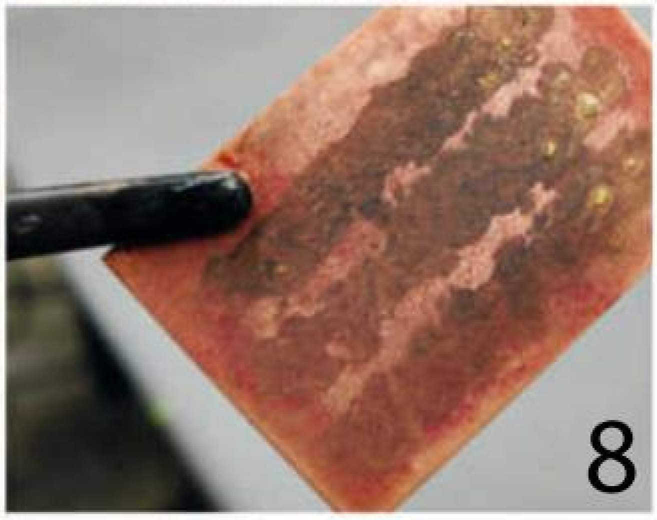
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had decent charcoal blocks, but we did have firebricks and lots of broken pieces of charcoal. To charge a firebrick, rub broken bits of charcoal over the entire surface of the firebrick.

Create the soot layer. Use tweezers to hold the copper piece gold-side down. Slowly pass the metal through a candle flame **[3]** until the surface is jet-black with soot **[4]**. Place the copper soot-side-up on the prepared firebrick. This setup, with the carbon-covered copper and firing surface covered with charcoal, will create a reducing atmosphere in the next step.

Firing

Fire the Aura 22. Light your torch (see "Choosing a Torch," *opposite page*). Adjust the gas until you create a soft, bushy, flame with a bit of orange at the tip. If the flame blows out, relight the torch, and increase the amount of gas.

Your natural instinct will be to move the flame around as if you are soldering. Don't! Come straight down on the copper. You'll see the flame curl upward, making a curved, disk-like shape; this is called the corona **[5]**, and it's key to this technique. Once you commit, do not move the torch around. You want to fully cover the copper with the flame; any movement of the torch can expose parts of the copper to the air, which will cause oxides to form.

Now comes the part that's like explaining how to ride a bike. Once you get it, you'll get it, but you might topple a few times before getting it right. Watch what's going on with the soot. Some areas will start to glow red, and the outline of your gold will start to appear. Wait two seconds after you see this, then pull the torch away for a split second and return it immediately. Hold the flame on the piece for longer than the length of time it was pulled away. Continue to pull the torch away and return it until all the soot has been burned away **[6]**. Turn off the torch.

NOTE: The copper will look pretty bad at this point. It may look like areas of the Aura 22 were burned off, but don't worry, they weren't. If you did overheat the metal, the gold will have begun to alloy with the copper and pass into the surface, but have no fear — all is not lost. In my experience, it's better to go too far with

super pickle

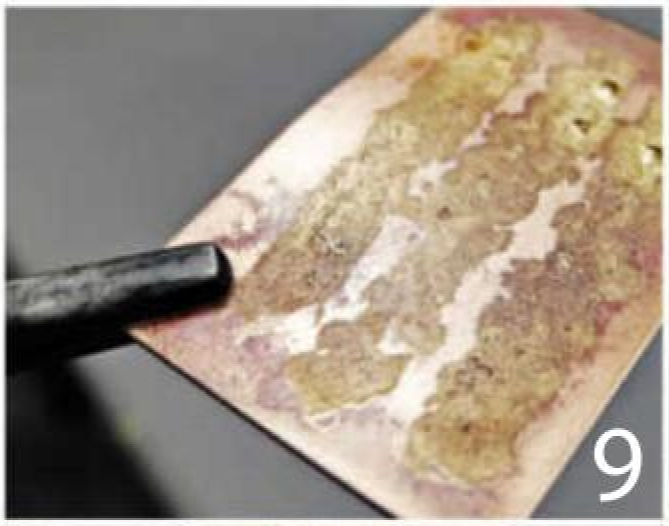
Super pickle is a generic term for a family of hydrogen peroxide, sodium bisulfate (Sparex), and white vinegar pickles. They are used with copper or copper-bearing alloys, such as brass and bronze. It is also good for pickling nickel to remove the copper flash that appears after it's heated. This recipe contains only sodium bisulfate and hydrogen peroxide, though other variations may contain white vinegar.

Recipe

Pour 16 fl. oz. (473 mL) of hydrogen peroxide into a plastic or glass container. Mix in 2 oz. (56.7 g) of sodium bisulfate until it dissolves.

Disposal/Reuse

Place steel wool into the pickle to remove the copper from the spent solution. The steel wool pulls the copper out of the pickle almost instantly, turning it pink/rust colored. Dispose of the steel wool. The pickle can be reused, if desired. To dispose of the pickle, pour it into a large container of water, and use baking soda to neutralize the pickle. Follow your area's hazardous-waste disposal guidelines for disposing of neutralized pickle.



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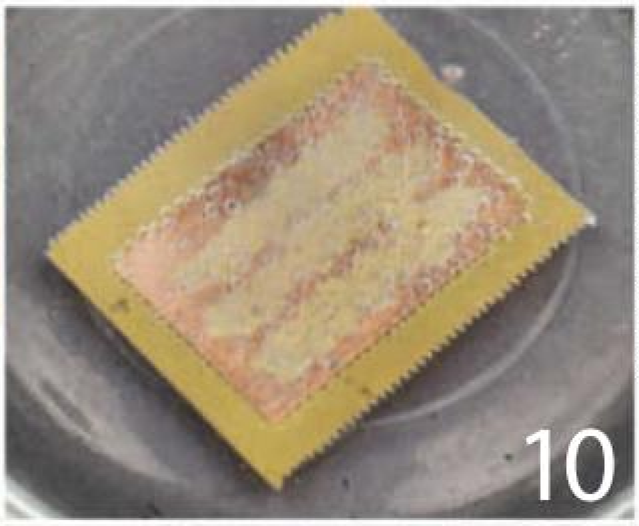

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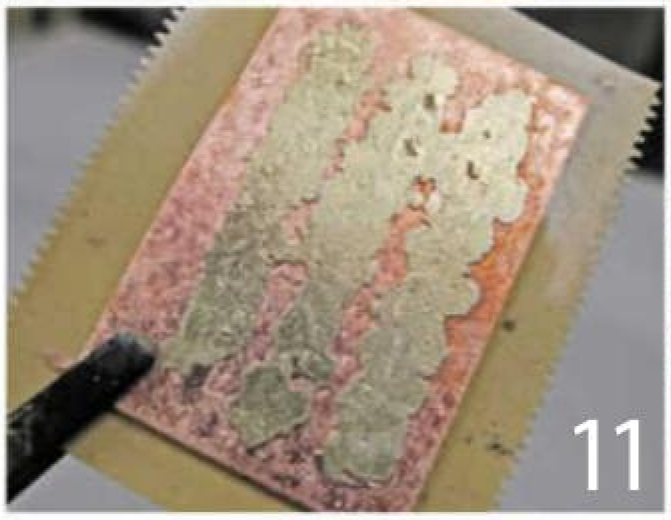

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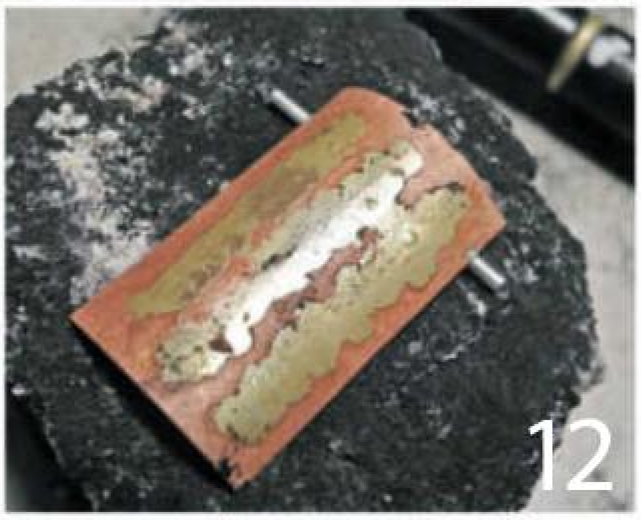

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Process photos by Christopher C. Darway.

the heat than to underfire the piece.

Quench the piece in water **[7]**. If any of the Aura 22 lifts from the surface of the copper, the piece was underfired. If this happens, clean the copper with super pickle (see "Super Pickle," *opposite page*), dry it, carefully lift up the Aura 22, and paint additional slip underneath it, like glue. Then, repeat the firing process.

Finishing

Pickle the piece. Place the piece in regular hot pickle until the pickle begins to remove the oxides. Remove the piece from the pickle **[8]**, rinse it, and gently brush it with a soft brass brush **[9]**. Place the piece back into the pickle, and leave it until the exposed copper looks pink with no dark spots or oxides. Remove the piece from the pickle, rinse it, and pat it dry.

Etch the copper. Apply packing tape to the back of the copper. Place the copper into super pickle. Within a few minutes, you'll see small bubbles appear on the surface of the metal **[10]**. This is normal.

NOTE: Remember when I mentioned that overheating can cause the gold to alloy into the copper? This part of the process depletes the copper from the surface, leaving the Aura 22 exposed.

In under an hour, you'll see a noticeable change in the color and surface of the exposed copper. Depending on the final use of your metal, you can stop at this point **[11]**. For a deeper etch, leave the piece in the super pickle overnight. Be careful though; a piece of copper will dissolve if left in this solution too long. Remove the piece from the super pickle, then rinse and dry it. Your metal is now ready to be formed, soldered **[12]**, sawn, drilled, enameled, or patinated without fear of the Aura 22 coming off.

Try this technique with fine-silver metal-clay slip! The process is the same until the silver becomes liquid, and it coats the copper like solder.

size limitations

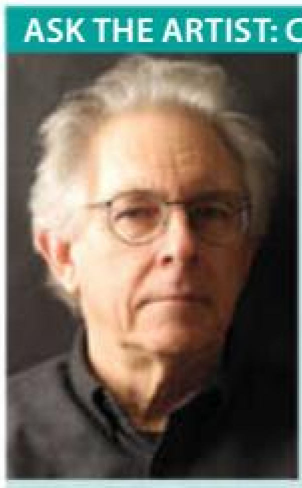
For this technique, the flame needs to cover the entire surface of the metal to prevent oxygen from reaching the surface of the copper. Use the largest torch tip you have, and aim the flame at a firebrick to gauge how large of a piece of metal you can use based on how large the flame is. You can also use multiple torches for large pieces if you are comfortable holding a torch in each hand.

choosing a torch

Use a torch that will let you lower the line pressure or control the amount of air mixing with gas. I like an acetylene torch, such as a Prest-o-Lite or Smith. When I teach where an acetylene tank isn't allowed, I use the EZ (ORCA) Torch with MAP-Pro (a propylene/propane variant) fuel. One nice feature of the EZ Torch is the air-adjusting control ring on the torch head. It comes with three different-size tips; use the largest.

author's note:
Metacognition is the knowledge of knowledge, or knowing about knowing. The technique I describe here combines the physical ability of metals to alloy, a paper on sterling silver granulation written by John Cogswell in 1984, an old welder's trick of putting soot on aluminum to find the annealing temperature, and a paper on making pickles using household chemicals by Bill Seeley. And, of course, the invention of Aura 22.

ASK THE ARTIST: CHRISTOPHER C. DARWAY



What studio mistake have you learned the most from?

"Don't let aluminum scrap become mixed with sterling silver scrap. I have made this mistake. The only use for this 'exotic alloy' is a trip to the refiner."
Contact: cdarway@outlook.com

cover story

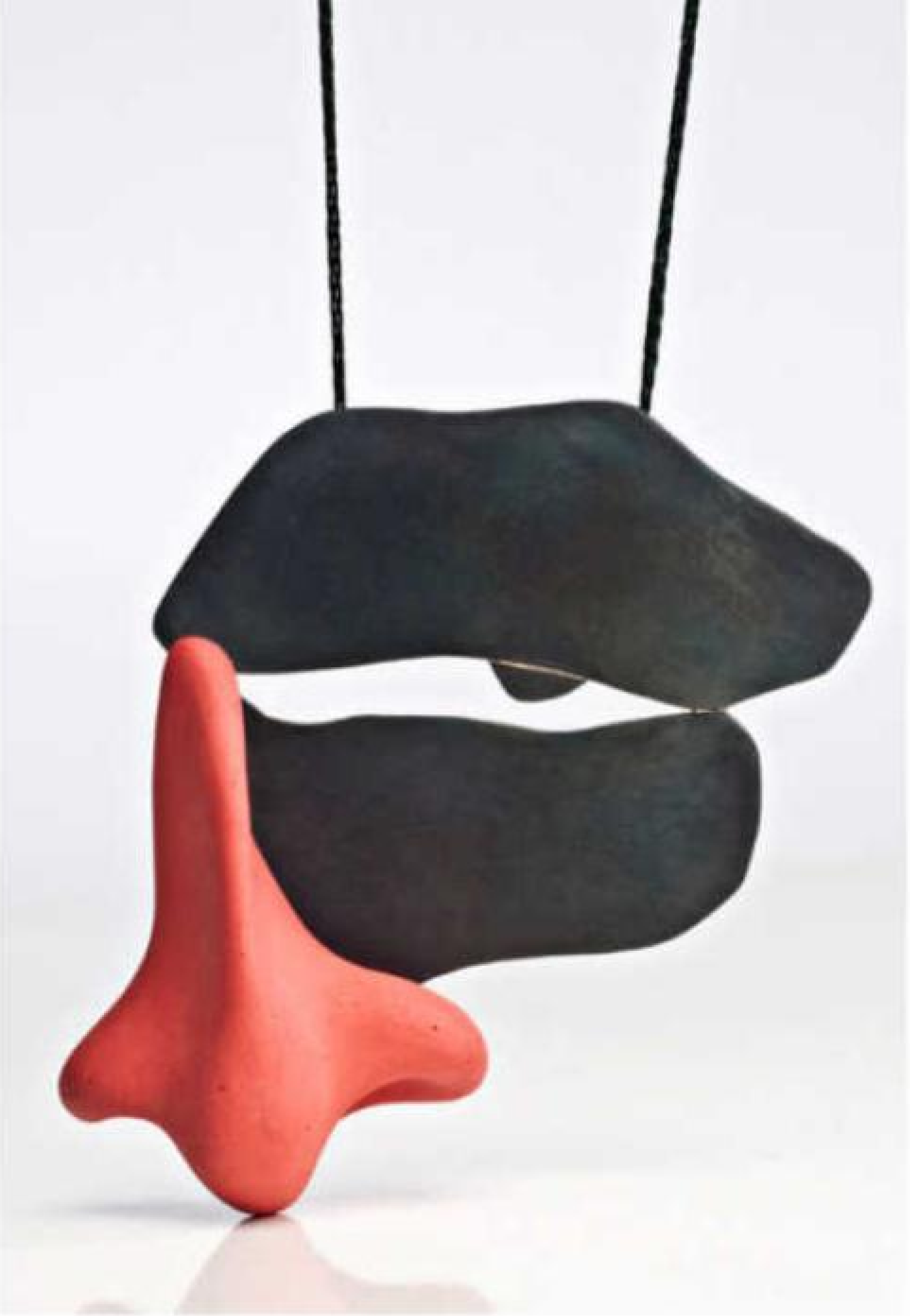
CERAMICS & PORCELAIN

In the jewelry world, "clay" has come to mean metal clay or polymer almost by default. But take a step back to the more ancient forms of clay, and see how adventurous jewelry makers are using those forms to break new ground in their field. Whether on its own, combined with metal or stones, left to imitate bone or stone, or glammed up with colorful glazes, ceramic and porcelain are prime for use by jewelers. The clay can take almost any form, texture, or color, and the medium's essential fragility makes it all the more striking and precious. AJ

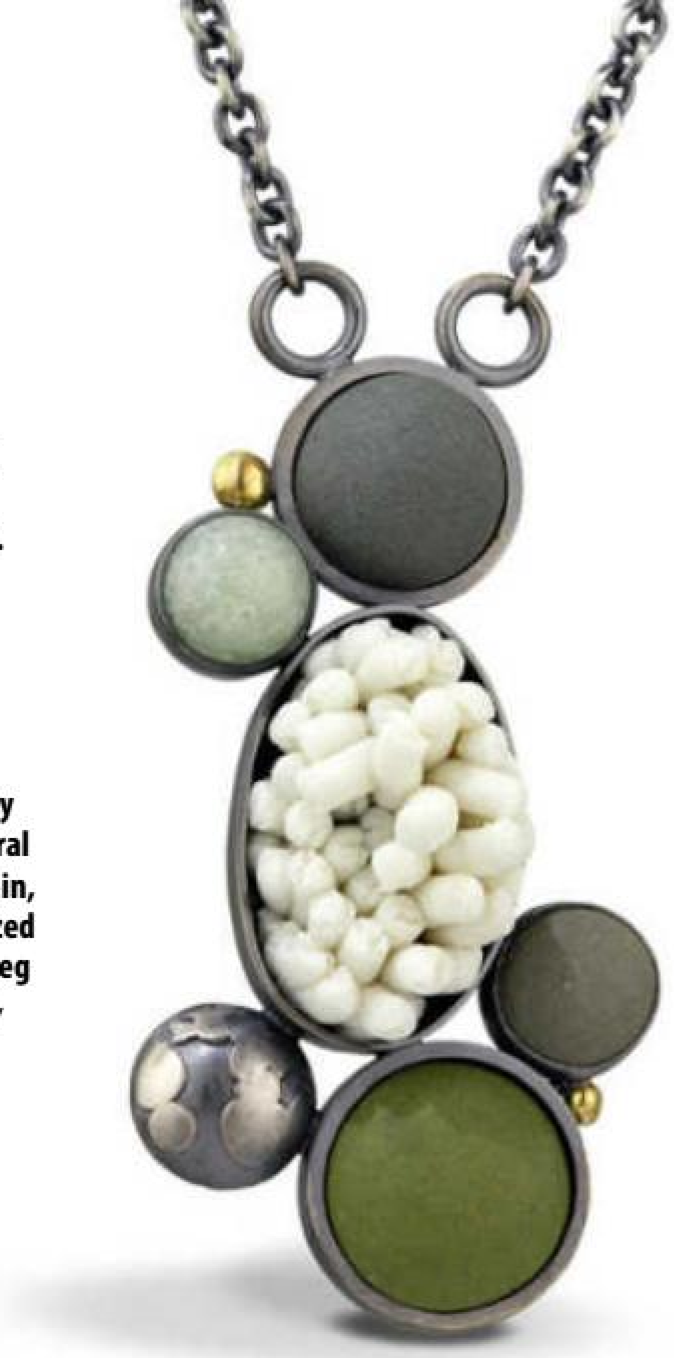
▲ **Gold-dipped white porcelain earrings by Barcelona artist Pilar Cotter. www.pilarcotter.com.** Photo courtesy of the artist.

► ***Grey Bone* earrings by Yasha Butler. Porcelain, sterling silver. www.yashabutler.com.** Photo by the artist.

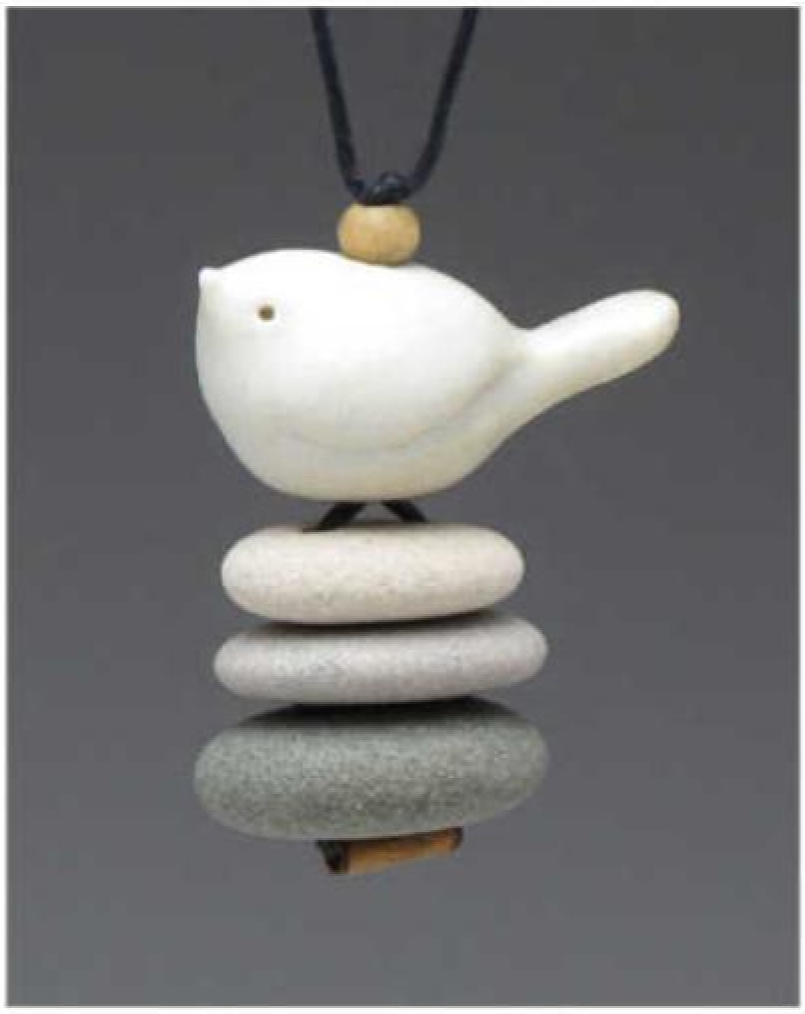
▼ ***Red Lantern* necklace, by Peter Hoogeboom. Taiwainese porcelain, sterling silver. www.peterhoogeboom.nl.** Photo by Conor Vella.

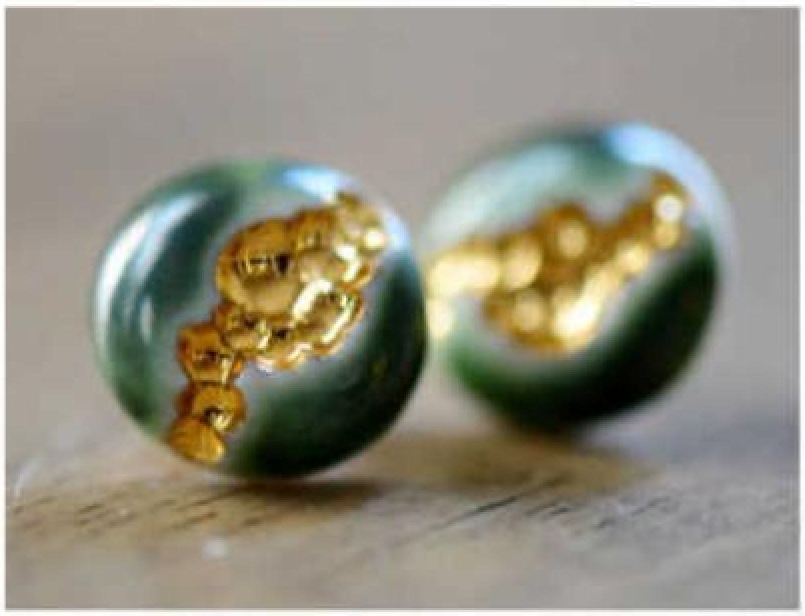


***As* brooch, by Istanbul artist Selen Özus. Iron, porcelain, and silk thread. www.selenozus.com.** Photo courtesy of the artist.



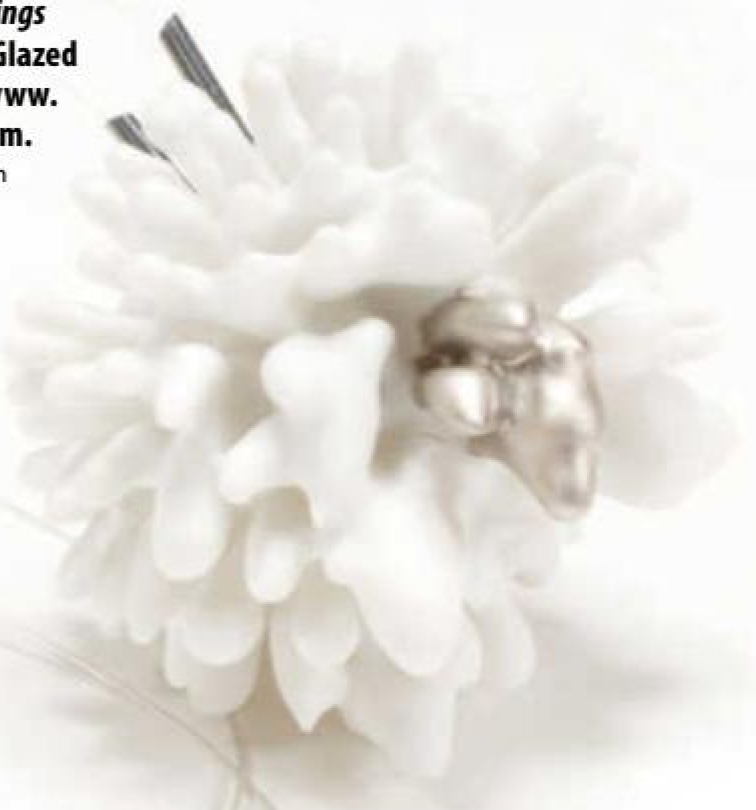
***Ocean Mood Necklace* by Patty Schwegmann. Natural white and colored porcelain, glass, 18k gold, and oxidized sterling silver. www.schwegmannstudios.com.** Photo by Cole Rodger.



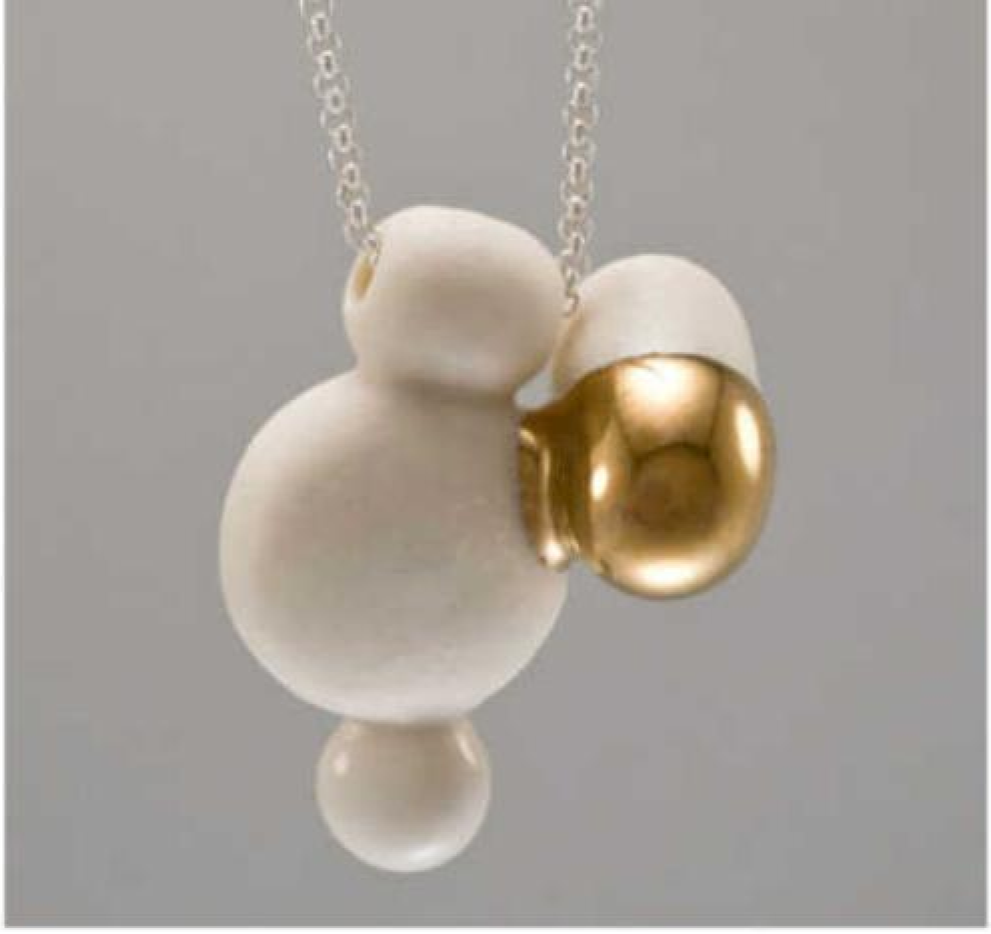


***Barnacle Stud Earrings* by Kimberly Heustis. Glazed porcelain, 22k gold. www.porcelainandstone.com.** Photo courtesy of Porcelain and Stone.

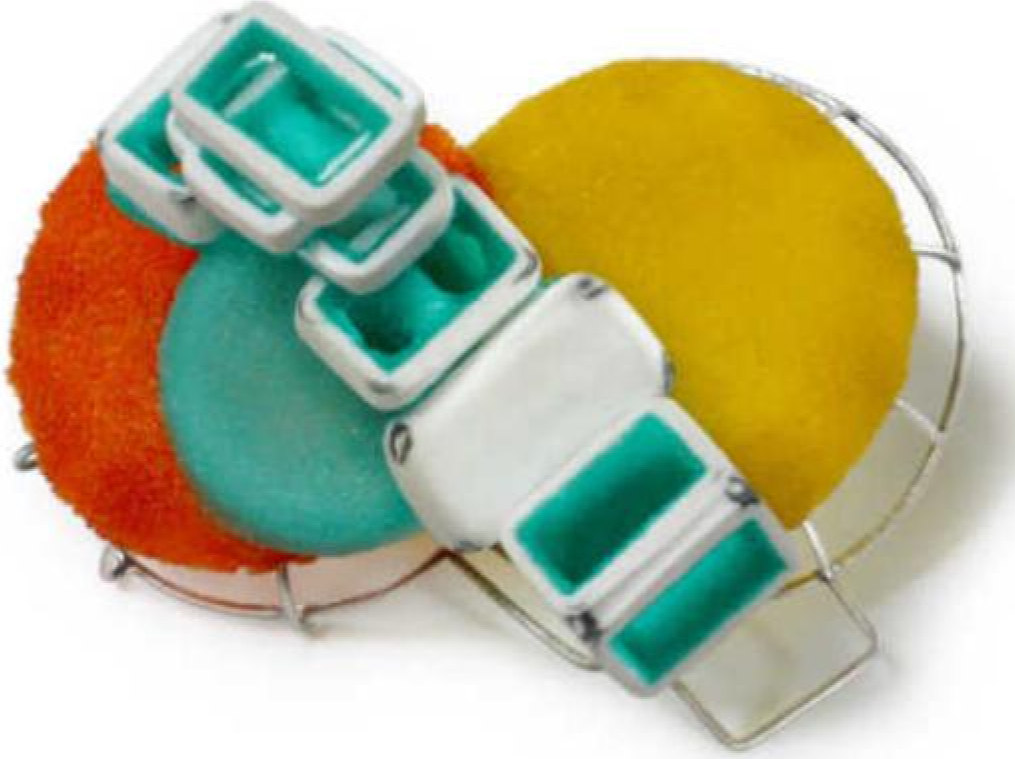
Pendant by Sue Davis. Hand-formed stoneware clay, bisque-fired, then glazed and refired; beach stones from Lake Michigan and Lake Superior. www.suedavisjewelry.etsy.com. Photo by Steve Vachon.



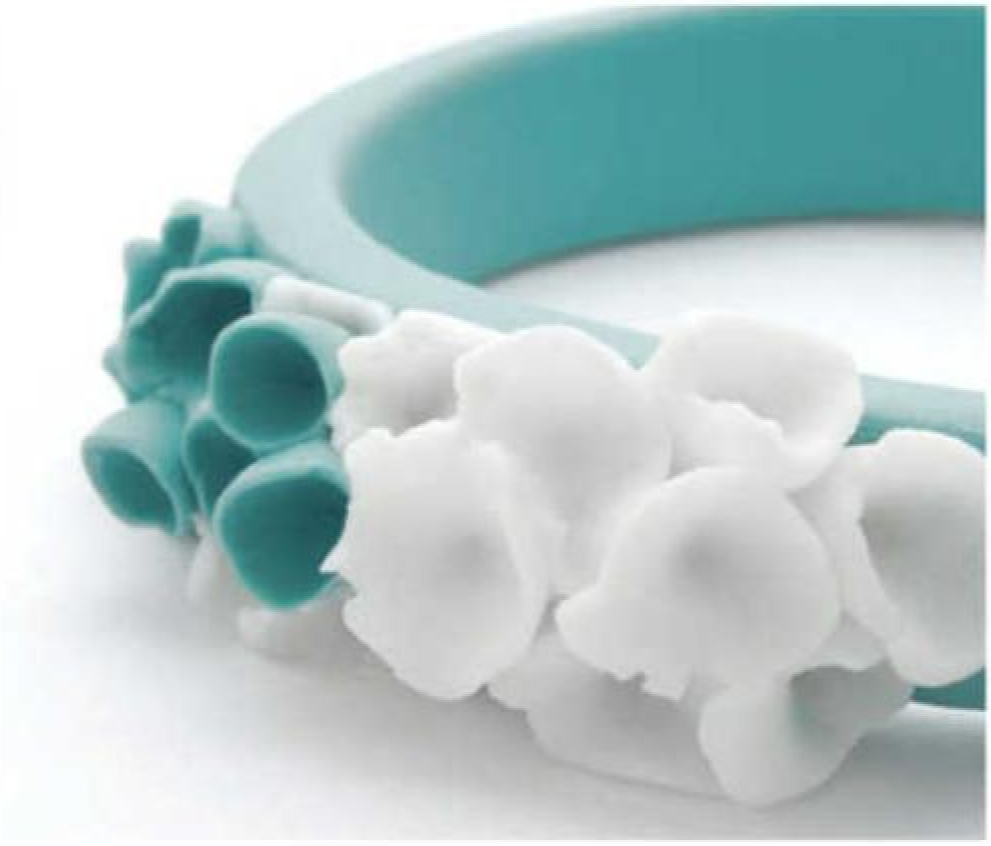
***Thistle* pendant by Nicole Jacquard. Porcelain, platinum luster, fine and sterling silver, nylon cord. www.nicolejacquard.com.** Photo by Sara Brown.



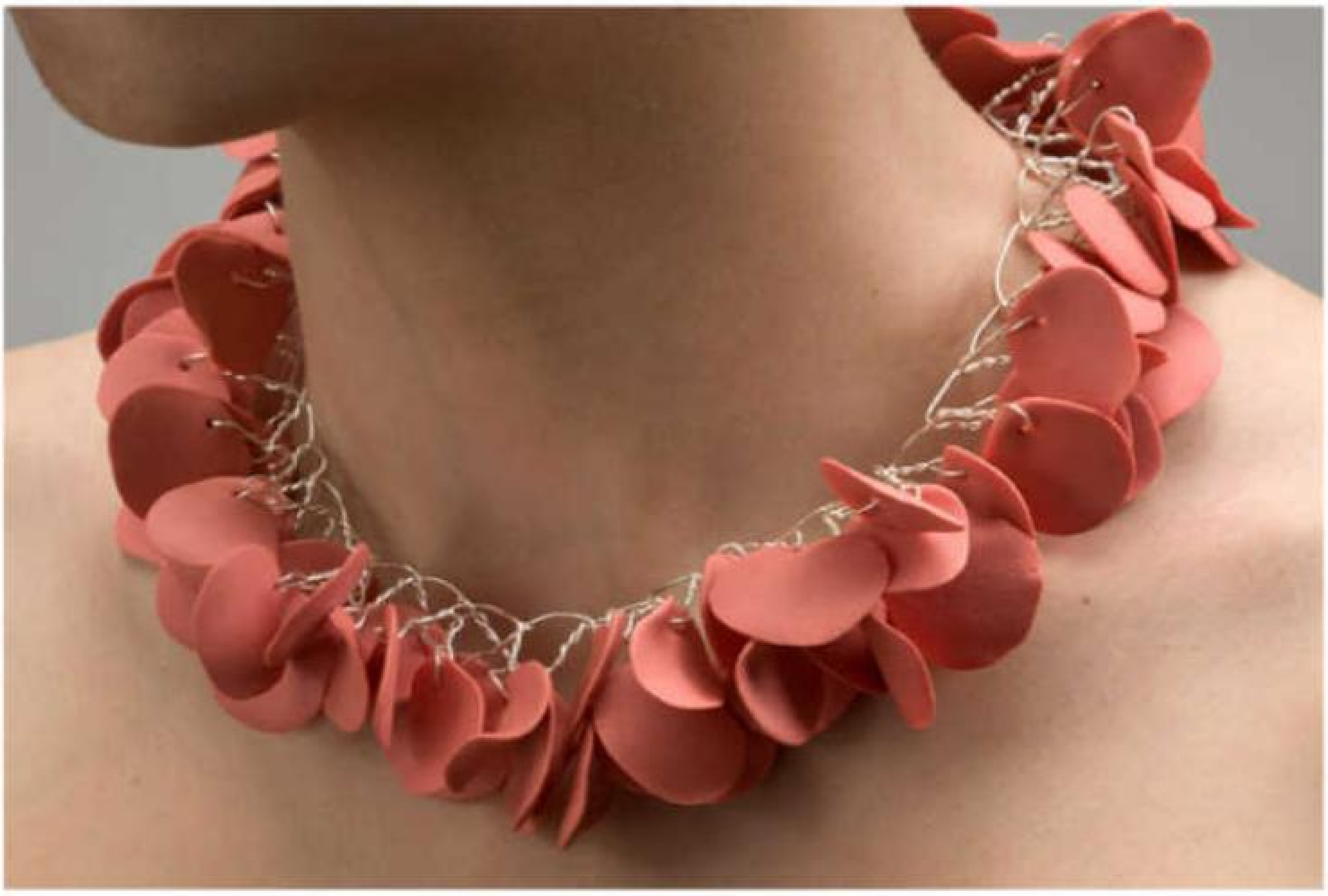
► **Necklace by Berlin artist Anna Kiryakova. Gold-brushed white porcelain. www.annakiryakova.de.** Photo courtesy of the artist.



▲ ***Adriatic Beach Resort V*** **brooch by Andrea Wagner. Sterling silver, white bone china porcelain, glass/resin composite, stainless steel. www.andreawagner.nl.** Photo by the artist.



▲ ***Chunky Flower Bangle*****, by Monika Skrzypkowska of MaaP Studio, London. Porcelain. www.maapstudio.com.** Photo courtesy MaaP Studio.



◄ ***Rose Choker*** **by Blake Williams and Amy Brown. Porcelain, sterling silver. Blake Williams: blakejwilliams@blakejwilliams.com; Amy Brown: browna95@msu.edu.** Photo by Tim Thayer.

GALLERY

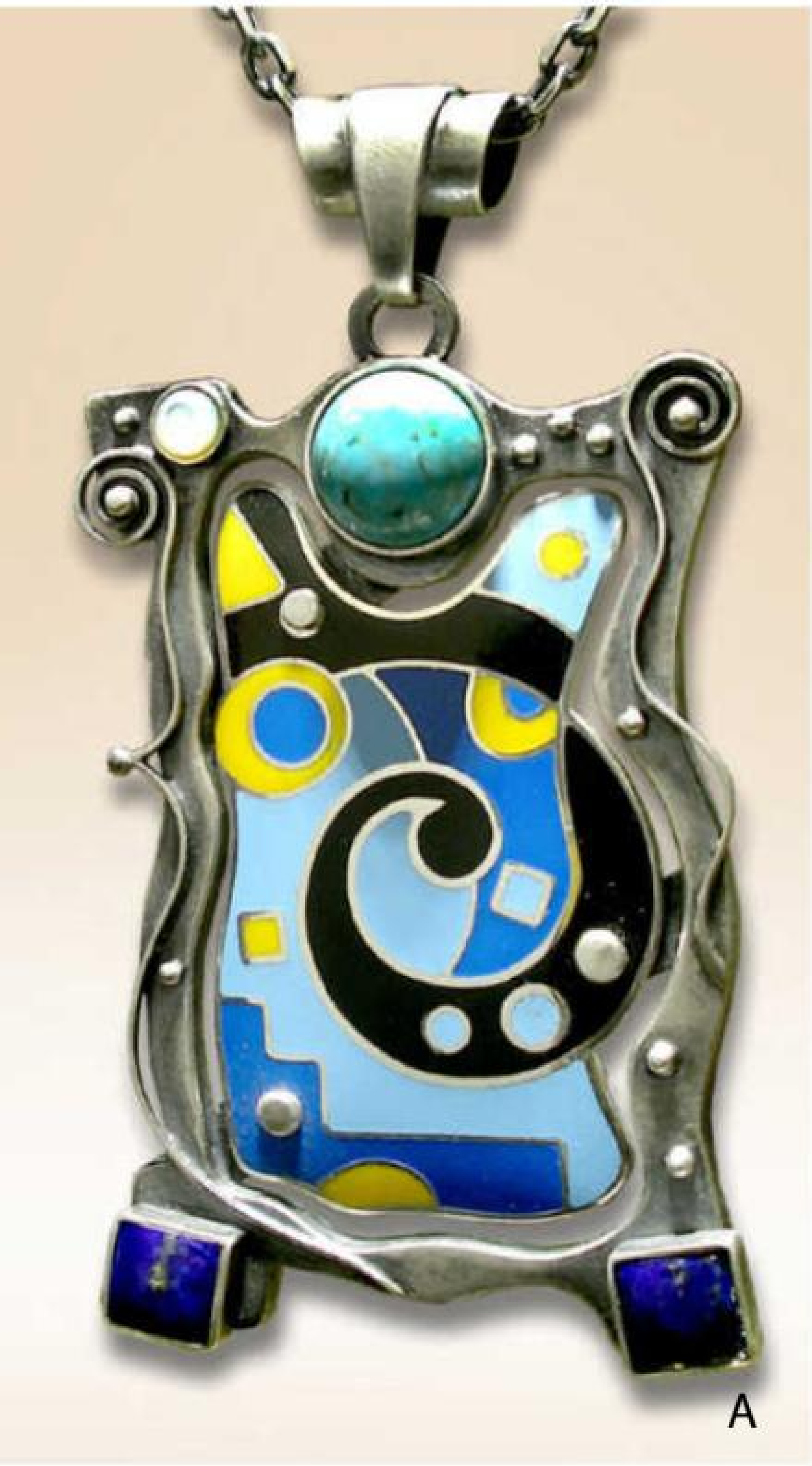
"Ever tried?
Ever failed?
No matter. Try
again. Fail again.
Fail better."
—Samuel Beckett

[Page 45] For *Amphora #4*, **Cyd Rowley** struck a balance between her love of ancient forms and the virtues of modern materials. The body is made of oxidized Argentium sterling silver, and the neck is traditional sterling. The top is set with a London blue topaz. Photo by Victor Wolansky Photography.

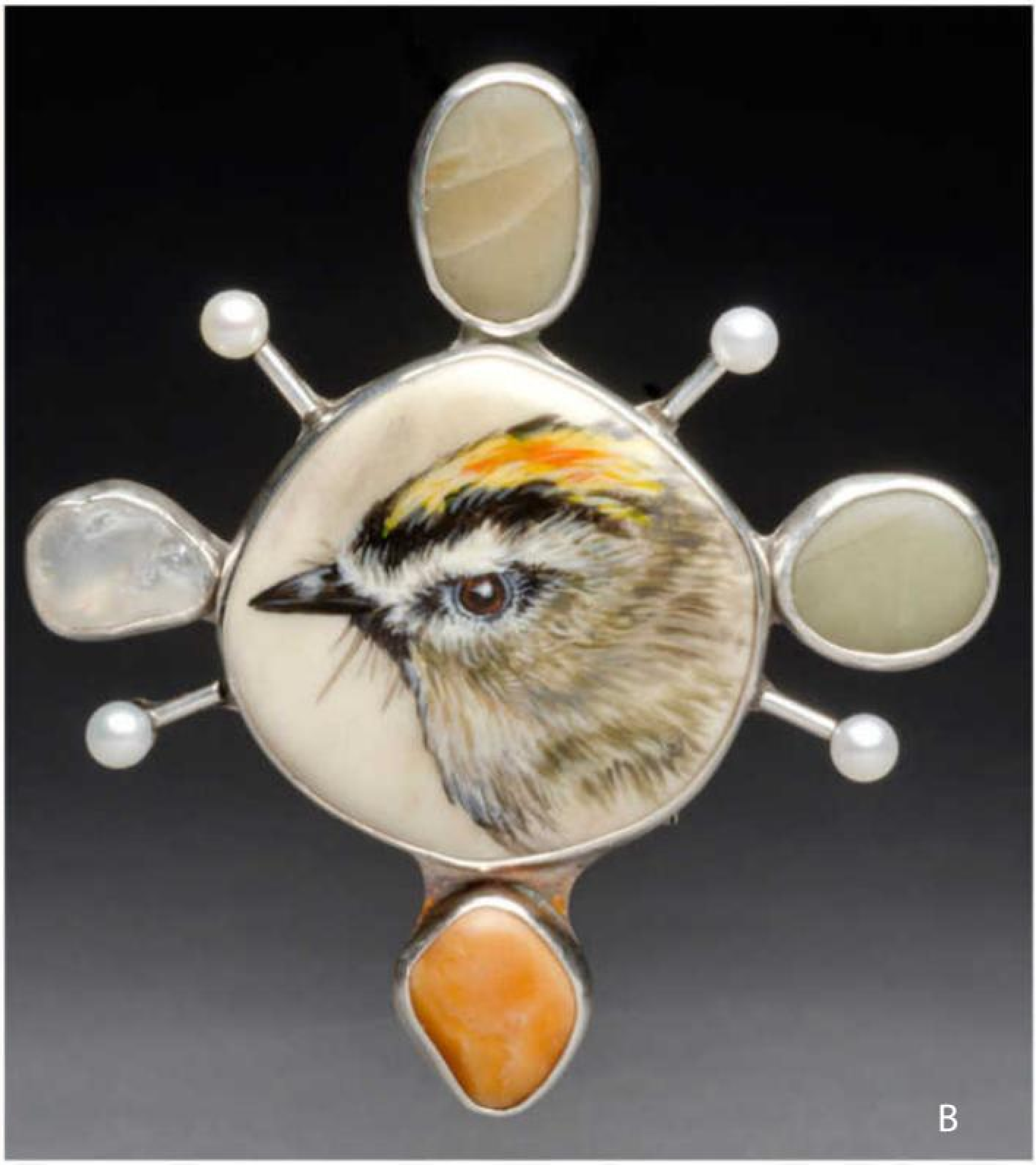
[A] Norman Man of Warsaw, Poland, drew upon memories of traditional fairy tales to make his *Cat* pendant, then added a dash of humor. Sterling silver, enamel, lapis lazuli, turquoise, and mother-of-pearl. 60 x 35 mm (2⅜ x 1⅜ in.).

[B] Delighted by the golden-crowned kinglets in the forests of Virginia, **Ali Wienboldt** created this pin/pendant of antler, sterling silver, found pebbles, pearls, and acrylic paint to express that delight. The piece opens to show the inscription: "May there be peace within your walls and security in your palaces. Psalm 122:7." 2¼ x 2⅜ in. (57 x 60 mm). Photo by Ellen Martin.

[C] Two adventurous artists came together to create this colorful brooch. Polymer artist **Helen Breil** had been experimenting with building three-dimensional bezels; she invited **Annie Pennington** to embellish one however she pleased. Pennington chose a mixture of materials — textured copper,



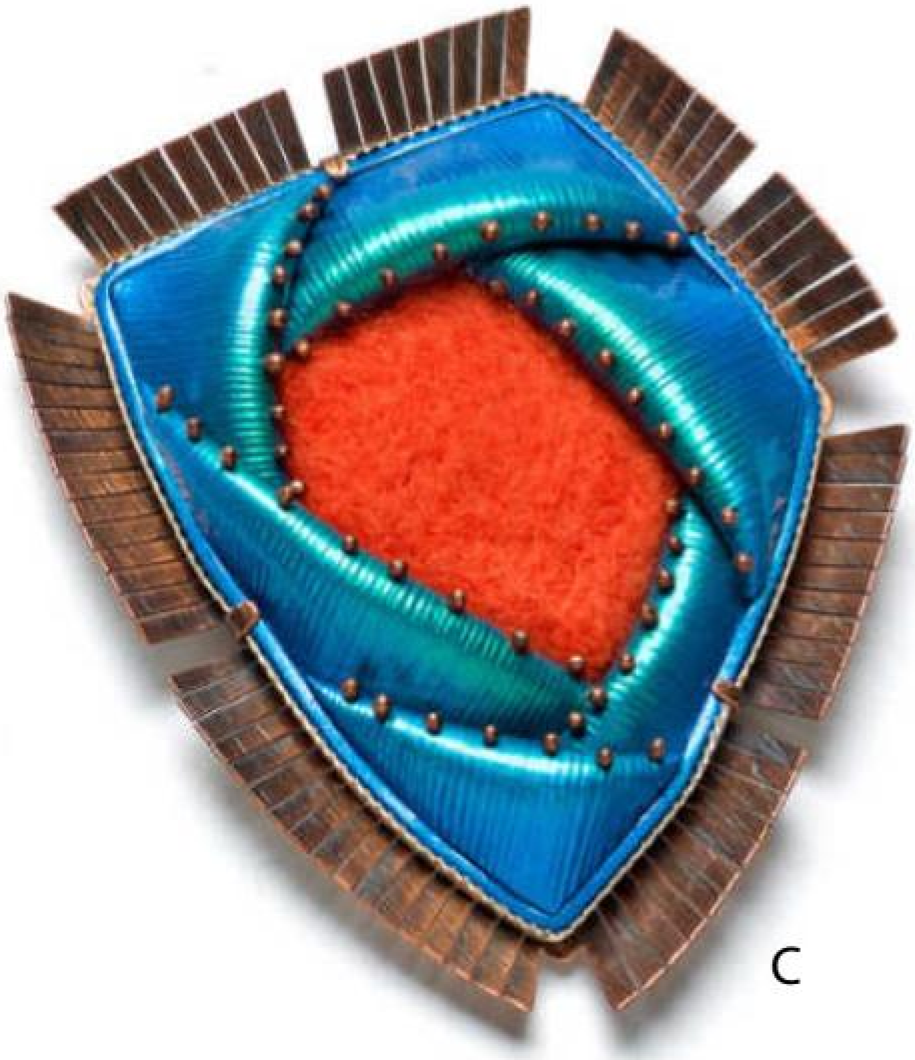
A

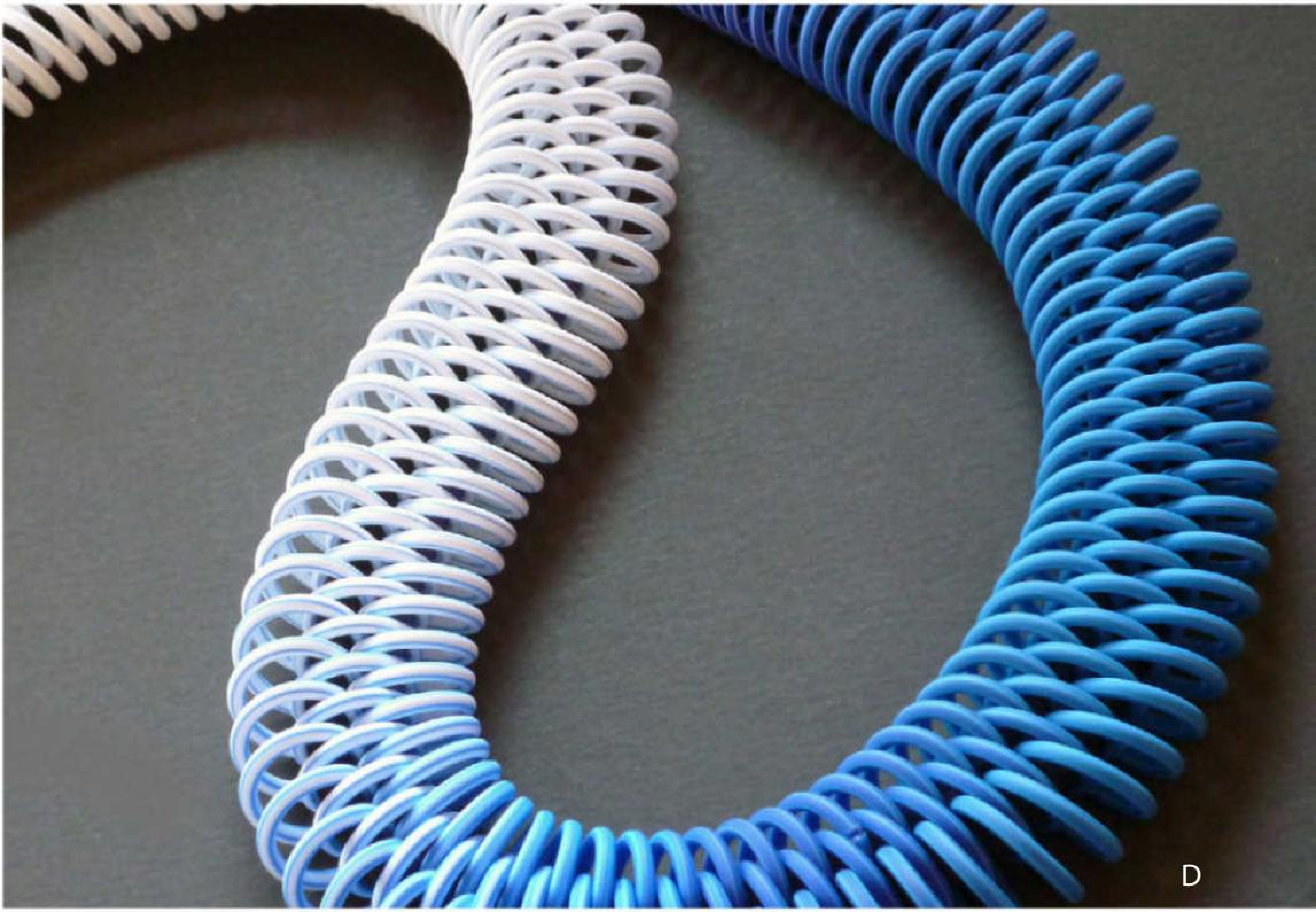


B

a fine-silver bezel, and a centerpiece of salmon-colored felt. 3 x 2½ in. (76 x 64 in.).

[D] Angela Garrod's *Heavenly Blue* necklace looks like chain mail, but is actually made of polymer clay. Garrod wanted to see how far she could push extrusion techniques — the result is a necklace that is incredibly strong, yet flexible and lightweight. 45 x 5.0 cm (approximately 17¾ x 2 in.).





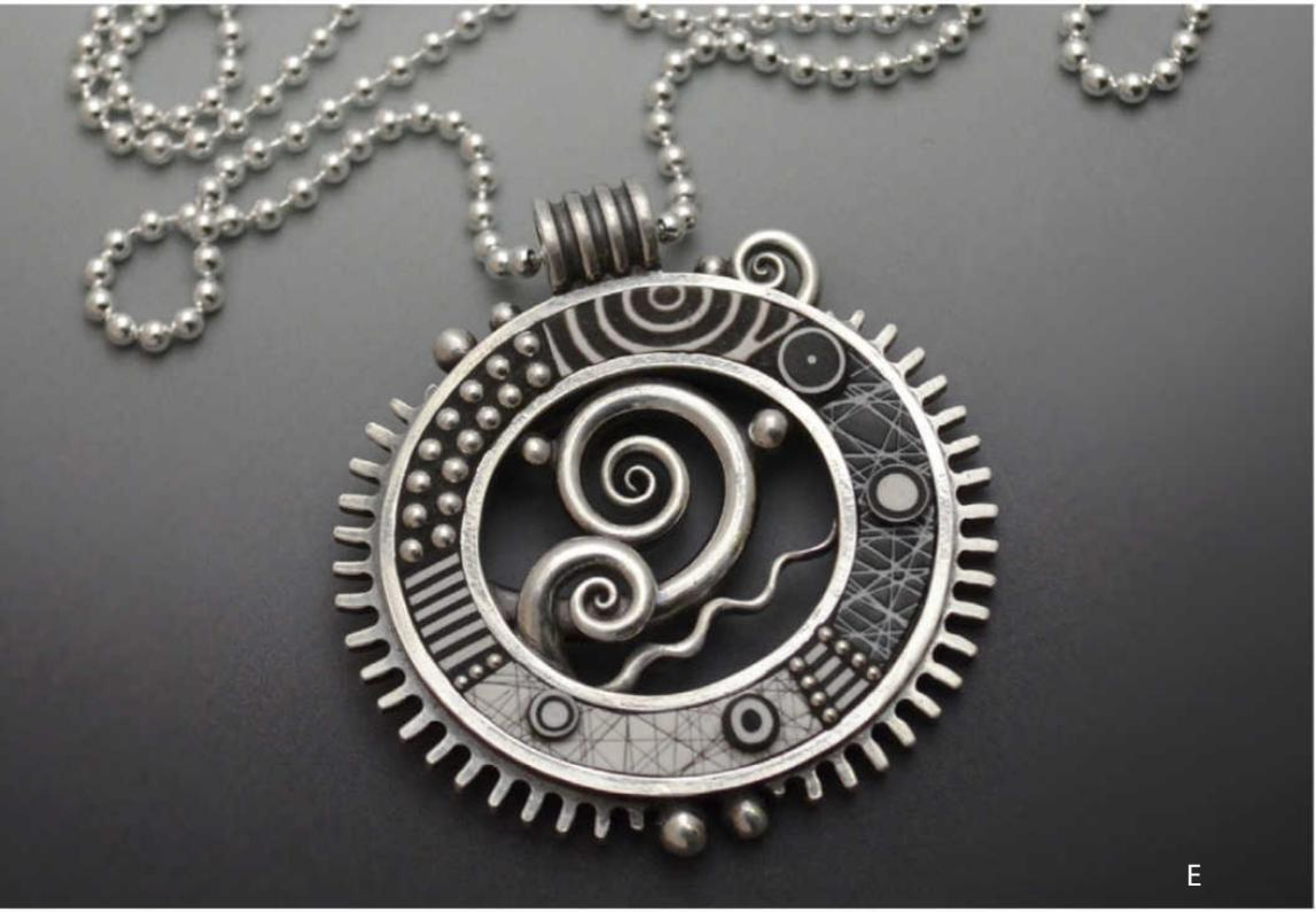
To contact the featured artists, see Contacts, **page 79**.

[E] For years, **Liz Hall** had been experimenting with using different formulations of fine- and sterling silver metal clay in combination with polymer to create intricate designs. For most of her pieces, she used black and white elements in a supporting role to a riot of iridescent rainbow colors. For *Black and White Escape*, Hall opted for a dramatic, monochromatic effect. 43 x 42 mm (approximately 1¾ x 1⅝ in.). Photo by the artist.

[F] Watching the birds in her garden, **Ann Marie Cianciolo** was struck by their elegance. How better to show off that style than by giving them jewelry and high heels to match? The ring and the bird are sterling silver; the details are 14- and 18k gold, spinel, garnet drusy, and a pearl. 1¼ x 1¼ x 1 in. (32 x 32 x 25.5 mm) Photo by Larry Sanders.

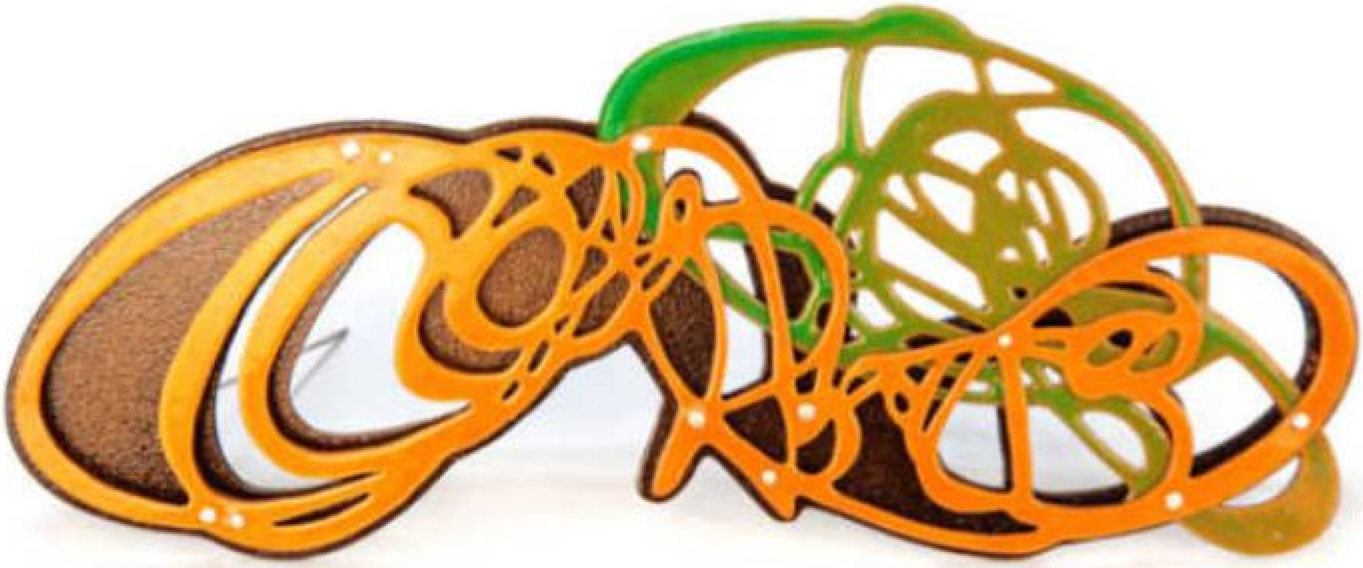
[G] *Jolly Brooch*, as fits its name, is an attempt by **Laritza Garcia** to "bring levity to the forefront." Garcia starts with drawings made with ink and calligraphy brushes, which she then develops into her finished jewelry pieces. The pierced copper and sterling silver brooch is enlivened with brilliantly colorful powder coating. Porter Price Coll., photo by the artist.

[H] To portray the great blue heron in its natural environment, Washington artist **Joan Tenenbaum** turned to a

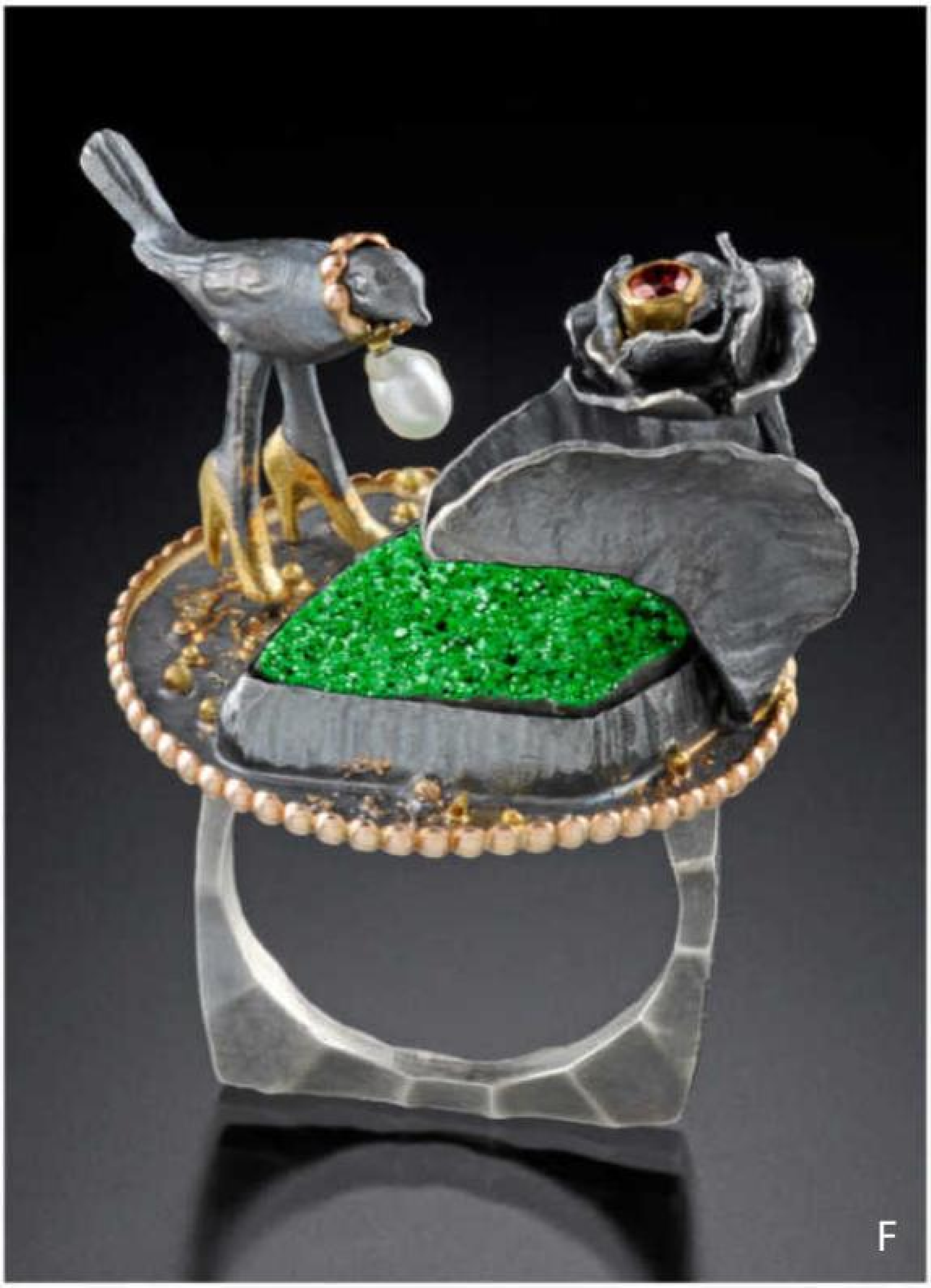


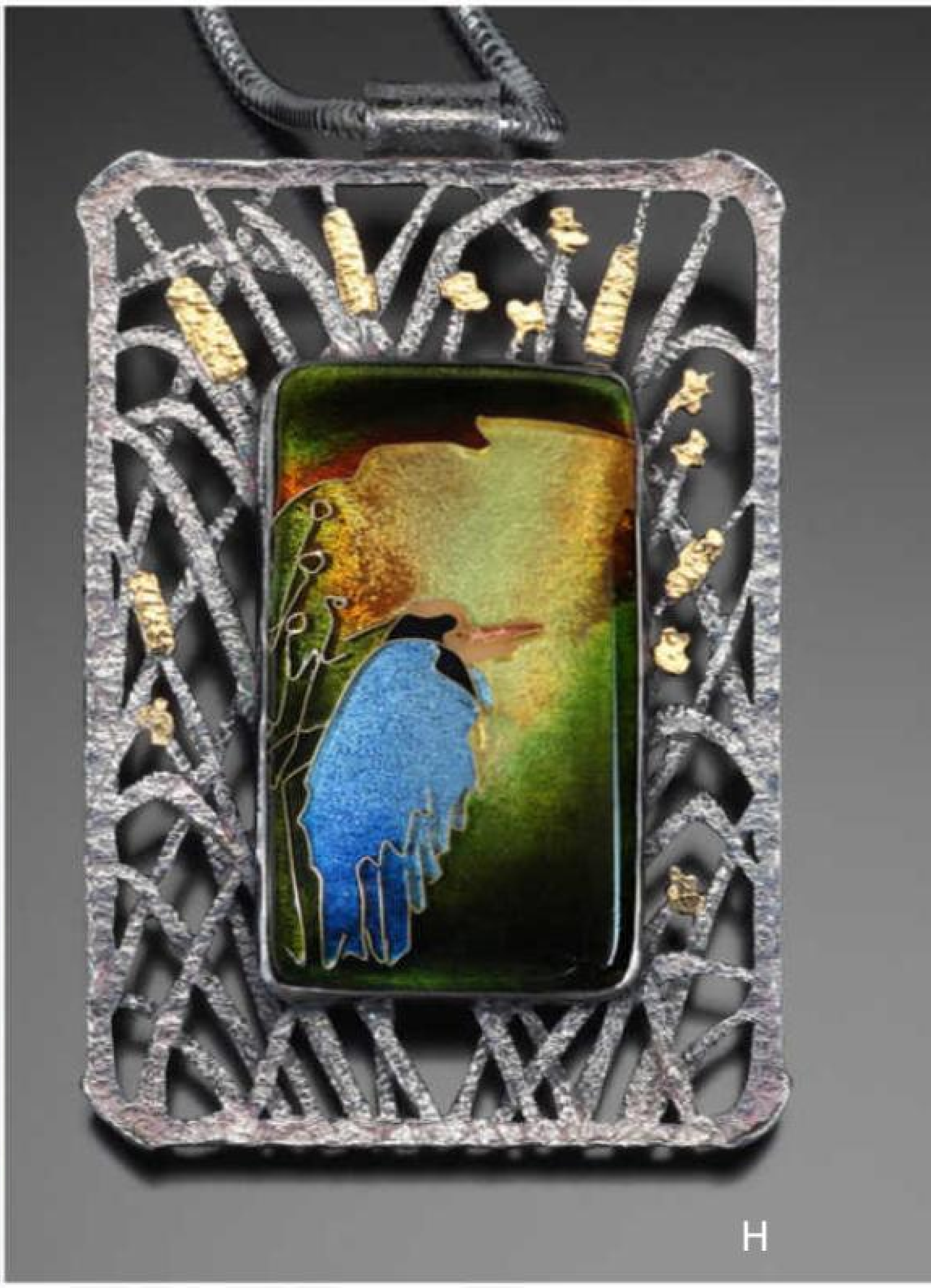
E

mixture of materials to capture the colors of a Northwestern lake at sunset. She used sterling and fine silver, keum boo, gold wire, and cloisonné enamel to realize her pendant, *The Heron in Wait*. 65 mm (2⁹⁄₁₆ in.) high.
Photo by Doug Yaple.



Want more inspiration? You can see these and over 450 other pieces that have been featured in our Gallery at **www.artjewelrymag.com/gallery**.





***To contact the featured artists, see Contacts*, page 79.**

Change up Your CHAIN MAIL with TWISTED RINGS

Commercially available jump rings give chain mail artists a feast of color choices — now, add a shift in texture to your expanded palette!

by Theresa D. Abelew

materials

for a 7¼-in. (18.4 cm) long bracelet

- Color-coated ("Enameled") copper jump rings:
  - 16-gauge (1.3 mm), 5 mm (0.188 in.) inside diameter (ID), rose gold, **65**
  - 16-gauge (1.3 mm), 4 mm (0.156 in.) ID, antique copper, **165**
  - Twisted, XL, 8 mm ID, rose gold/ antique copper, **20**
- Color-coated ("Enameled") copper S-hooks, rose gold, **2**
- 24-gauge (0.5 mm) copper wire (optional)

toolbox, *page 77*

- Chain mail

Find out where to buy supplies, *page 79*
See Safety Basics, *page 76*

BASICS & VIDEOS

Learn fundamental techniques in these bonus tutorials:	B	🎥
Opening and closing a jump ring	●	●

B Basics, *page 75*
🎥 Videos, www.artjewelrymag.com/videos

Color-coated copper jump rings are a wonderful and inexpensive way to add color to chain mail, while twisted jump rings are an easy way to add texture. But when you combine both of those attributes — wow, now you've got something! The twisted jump rings are made of two thin strands of color-coated wire twisted together into one substantial ring. The only drawback was that these rings were *too* easy to open: I didn't even use my pliers! That's great when you need to open a ton of them, but not so great when you need strength and stability in a weave. To compensate for this, I incorporated the twisted rings into a Japanese-style pattern, where the jump rings are all used in pairs.

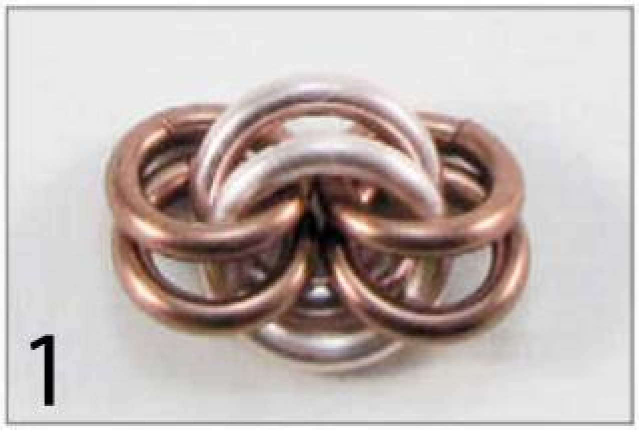
To begin:

Open 65 16-gauge (1.3 mm), 5 mm (0.188-in.) inside-diameter (ID) rose-gold jump rings (base rings).

Open 20 twisted 8 mm ID jump rings.

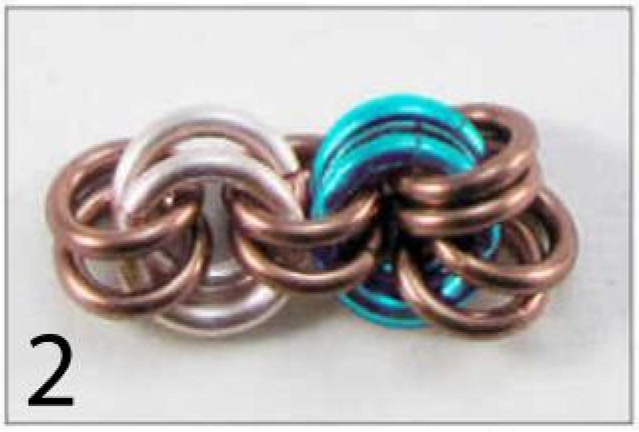
Open and set aside two 16-gauge (1.3 mm) 4 mm (0.156-in.) ID antique-copper jump rings (connector rings).

Close the remaining 163 connector rings.



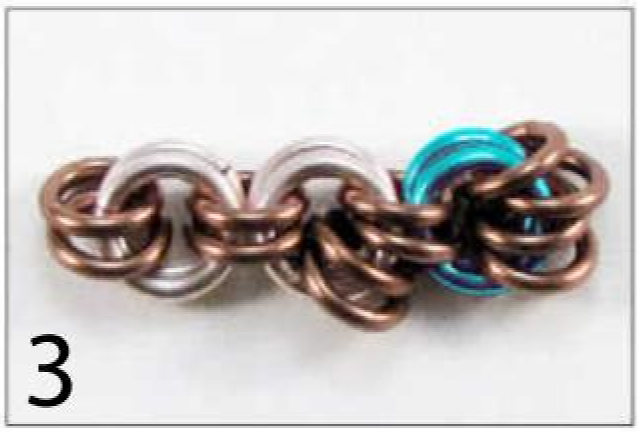
1

Thread an open base ring through four closed connector rings. Close the base ring. Thread a second base ring through the same path as the first and close it — this is called doubling. Arrange the rings so that two connector rings are on either side of the base rings, as shown.



2

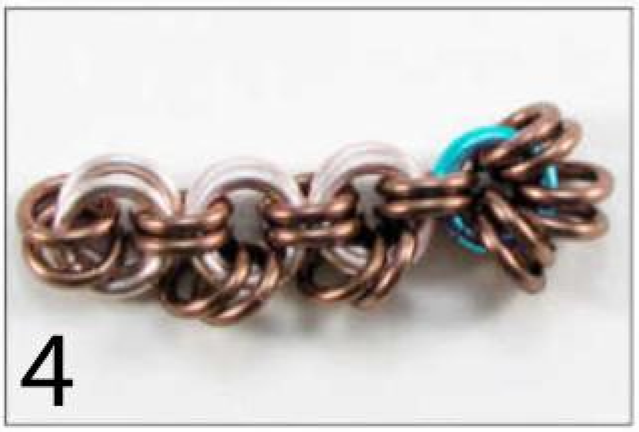
Use an open base ring to pick up four closed connector rings. Thread the base ring through one pair of connector rings from the previous step. Close the base ring and double it.



3

Separate the four connector rings added in step 2 into two pairs. Use an open base ring to pick up four more closed connector rings. Thread the base ring through the top pair of connector rings. Close the base ring and double it.

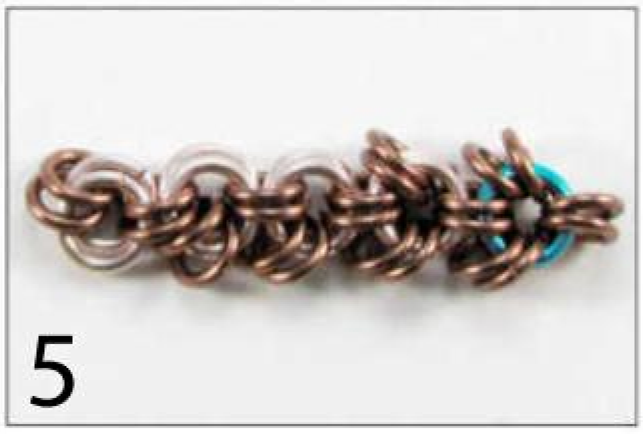
NOTE: As you work, make sure the spare pair of connector rings from each base-ring set all face the same direction. In this case, they run along the bottom edge.



4

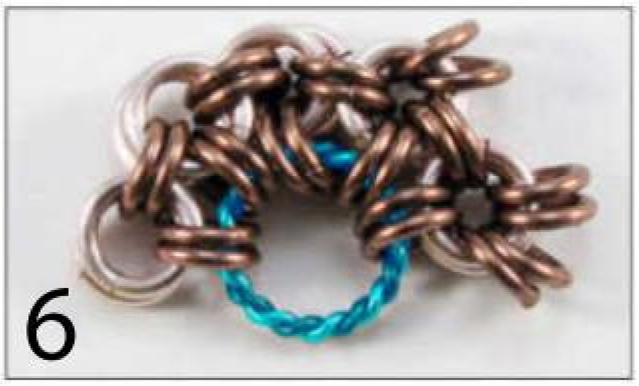
Use an open base ring to pick up six closed connector rings, and thread it through the top pair of connector rings from step 3. Close the base ring and double it.

NOTE: This is a tight fit. You may find it easier to pick up only four closed connector rings. Then, after doubling the base ring, open and thread the last two connector rings along side the previously added connector rings.



5

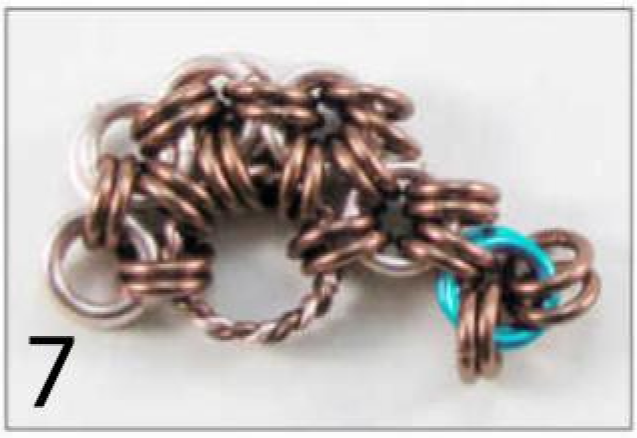
Separate the six connector rings added in step 4 into three pairs. Repeat step 4 to add a set of two base and six connector rings through the center-most pair of connector rings.



6

Orient the chain so that a pair of connector rings from each base-ring set runs along the bottom of the chain. Thread an open twisted ring through the five pairs of connector rings. Close and double the twisted ring.

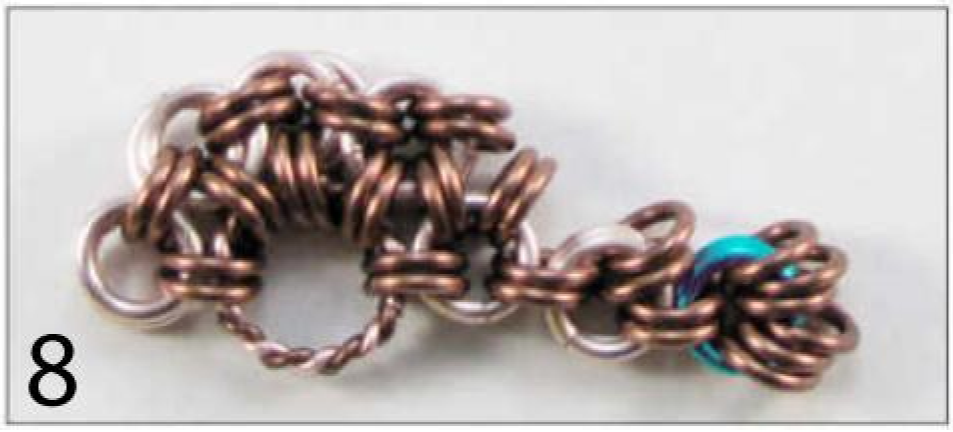
NOTE: Because of the nature of the twisted jump rings, the closure won't be perfectly smooth. After closing each ring, I found it helpful to rotate and tuck the join out of sight beneath the connector rings.



7

Thread an open base ring through the pair of connector rings closest to the twisted ring. Add four closed connector rings to the open base ring, then close and double the base ring.

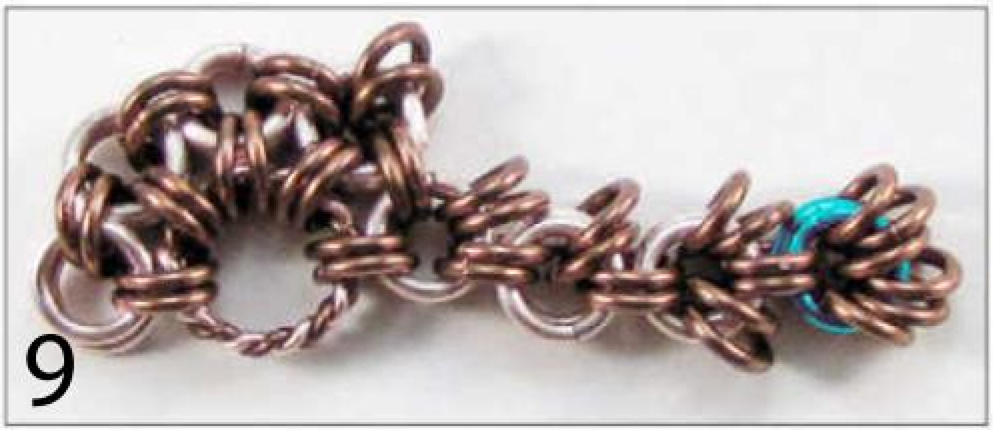
See "Tricks Against Nicks: How to Prevent Scratching Your Wire and Jump Rings" at **www.artjewelrymag.com/reference** to learn ways to protect your wire from tool marks.



8

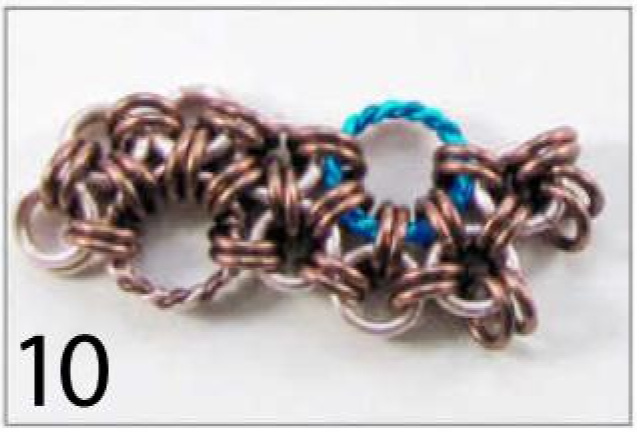
Separate the four connector rings added in step 7 into two pairs. Use an open base ring to pick up six closed connector rings. Thread the base ring through the bottom pair of connector rings added in step 7. Close and double the base ring.

NOTE: The spare pairs of connector rings should all face the same direction. Here they run along the top edge of the chain.



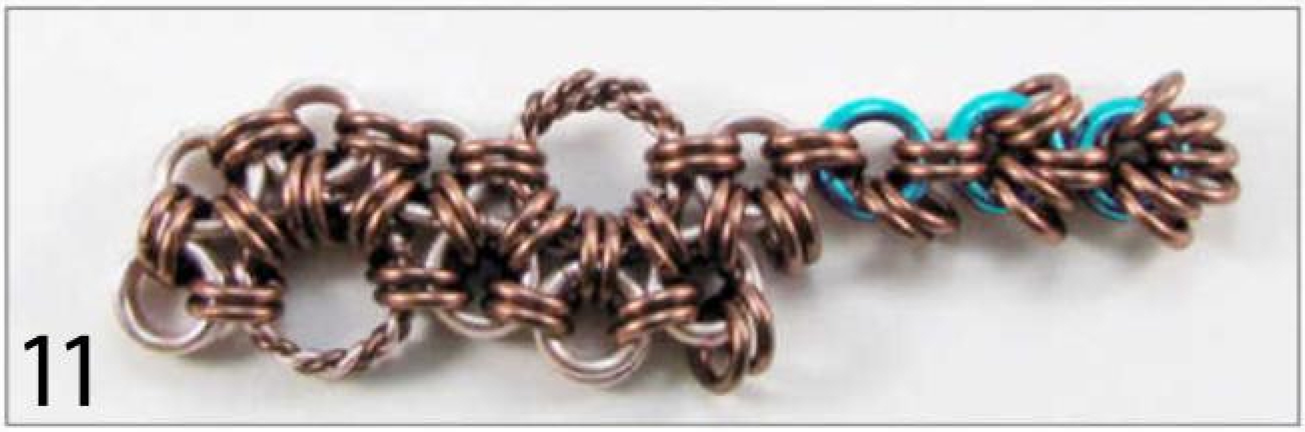
9

Repeat the step 8 to link another set of two base and six connector rings through the center pair of connector rings from step 8.



10

Thread an open twisted ring through the five pairs of connector rings along the top edge of the chain. Close and double the twisted ring.



11

Working off of the spare pair of connector rings closest to the twisted ring, repeat steps 3–6 to connect three sets of rings.

color-coated
jump rings

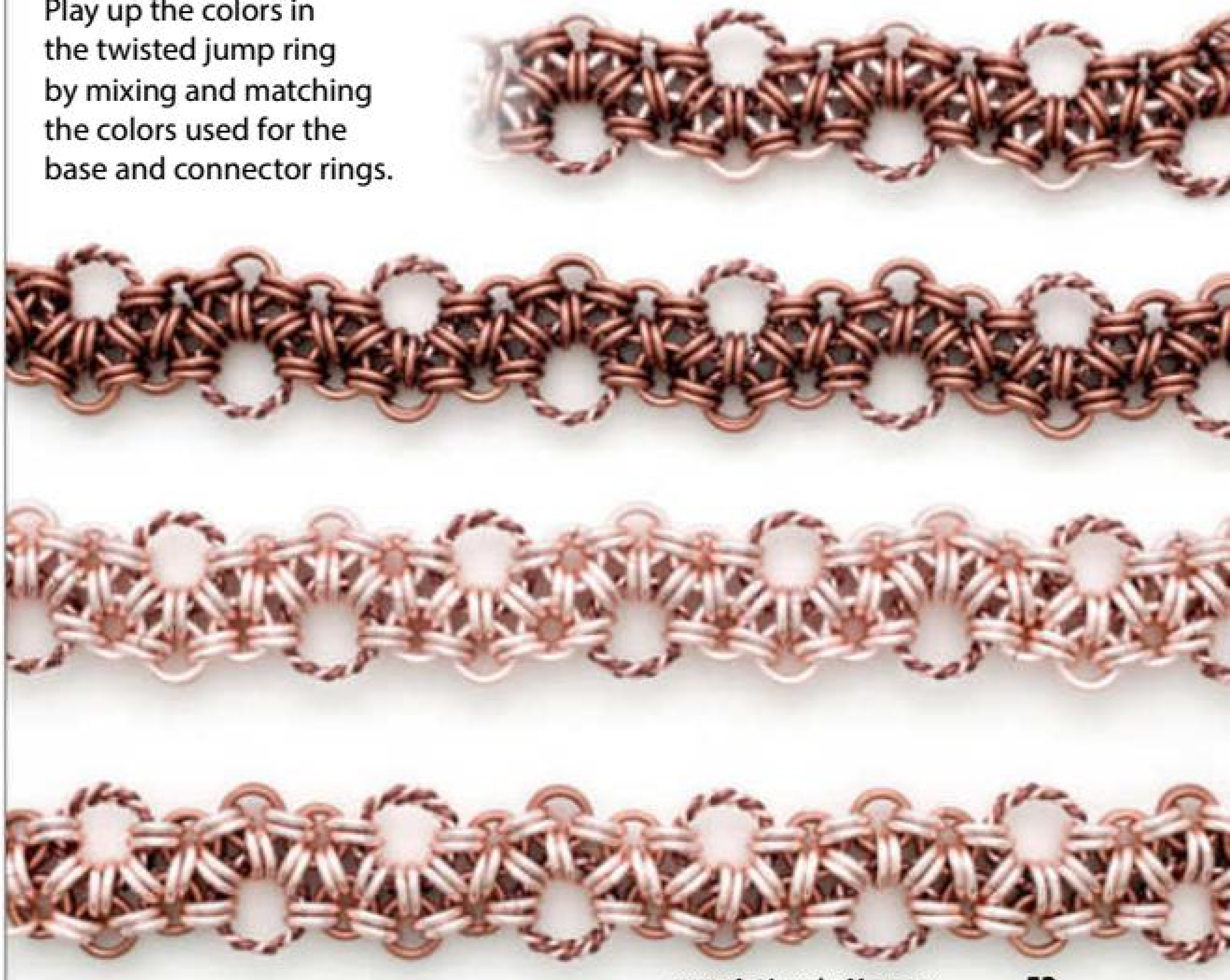
Although the color-coated copper jump rings are generally sold under the term “enameled copper jump rings,” the coating isn’t enamel in the classic sense. A vitreous enamel coating would envelop the copper ring in a layer of colored glass. And although it would be beautiful, it would make opening and closing the rings impossible to do without chipping and breaking off the enamel.

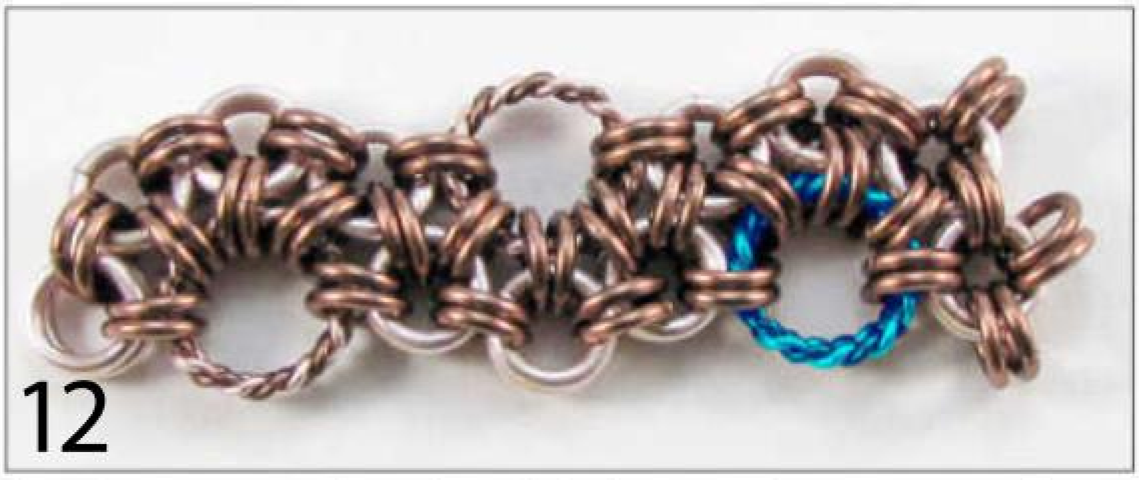
Wire is coated in plastic, then wound into coils and cut into jump rings. This is why you see the copper core at the cut. When the rings are properly closed, the copper should not be visible.

The plastic coating, while durable, it is not indestructable, and it can be accidentally scratched or damaged with rough handling or sharp tools.

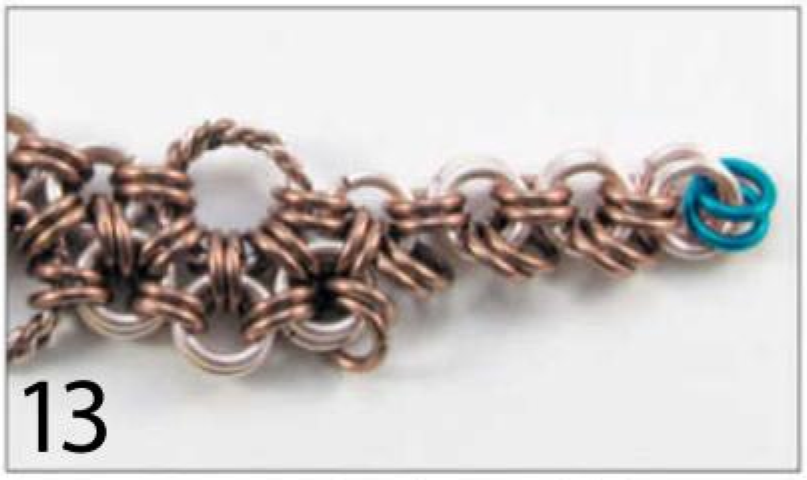
color options

Play up the colors in the twisted jump ring by mixing and matching the colors used for the base and connector rings.

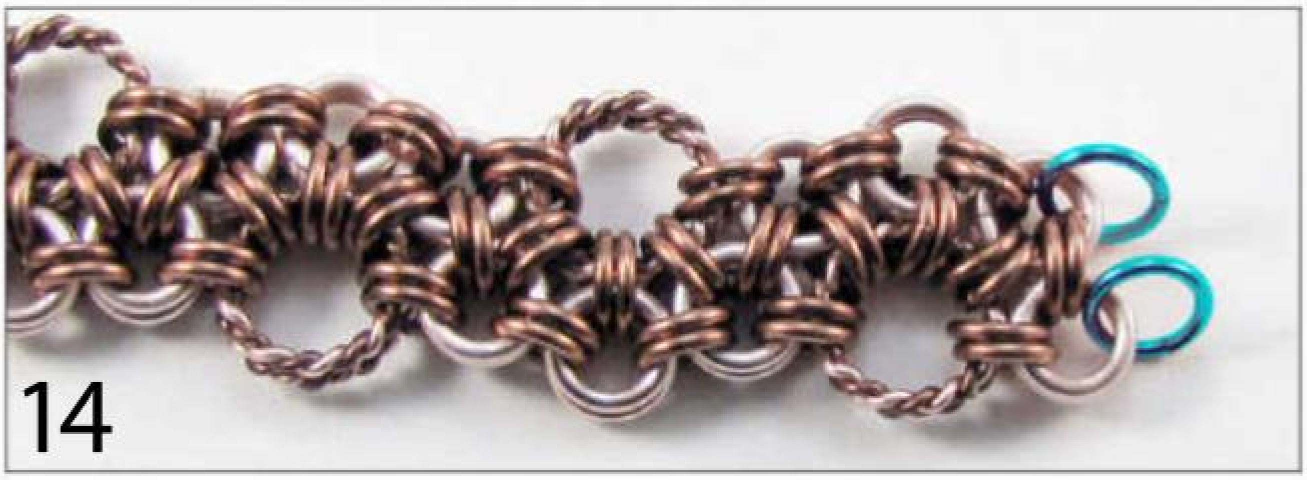




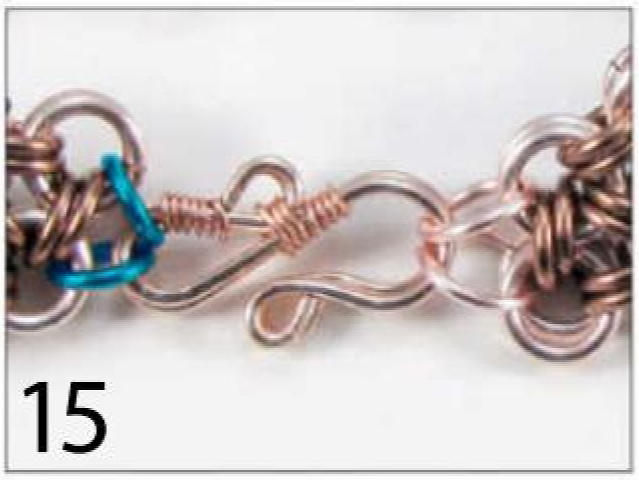
Thread an open twisted ring through the five pairs of connector rings along the bottom edge of the chain. Close and double the twisted ring.



Repeat steps 8–12 until you have used all the rings or your chain is the desired length. For the last base-ring segment, add only one pair of connector rings, before adding the twisted ring.



Attach the jump rings that came with the S-hook clasps to two pairs of base rings at the end of the chain.

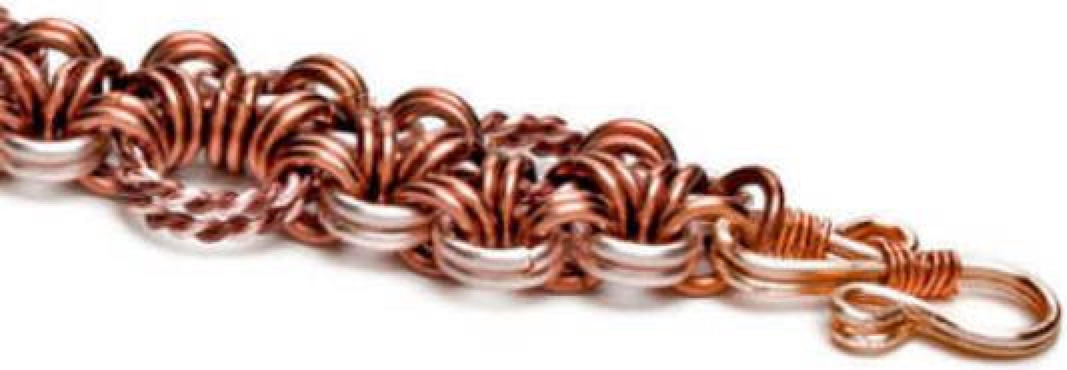


At the opposite end of the chain, use two connector rings to attach an S-hook (See "Reinforce Your Clasp," *below left*) to two pairs of base rings.

Process photos by Theresa D. Abelew.

reinforce your clasp

When using colored jump rings for a piece of jewelry, it can be difficult to find a clasp to match the style or color of your rings. I purchased enameled copper S-hooks in the same rose-gold color as my rings. Unfortunately, between my normally barbaric handling of jewelry and the weight of the finished piece, I didn't think one little S-hook would be strong enough to stand up to daily wear. Since there is strength in numbers, I found some 24-gauge (0.5 mm) copper craft wire and lashed the two S-hooks together.



ASK THE ARTIST: THERESA D. ABELEW

Photo by Evangeline V. Abelew.

What studio mistake have you learned the most from?

"I like to make chain mail in the car, especially during long road trips. But about 50 miles into one 1,600-mile trip, I discovered I'd brought the wrong size jump rings. Without easy access to my stash, I was forced to work with what I had. There was plenty of colorful language at first, but it forced me to experiment, and that's how I created my first original chain mail design, the Anansi Knot *(right)*."

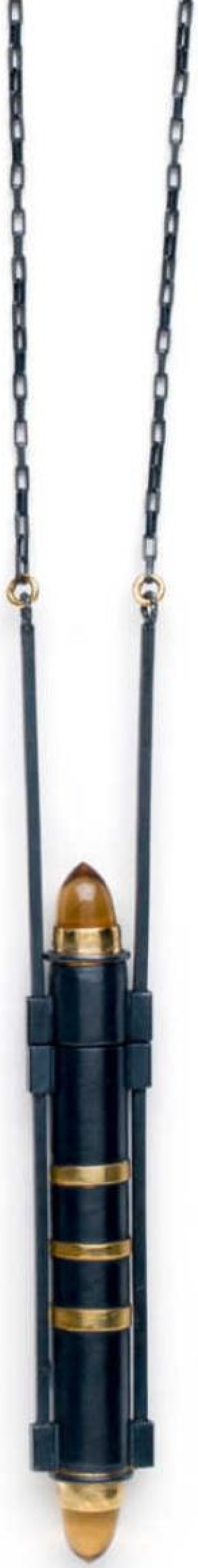
Contact: www.tdabelew.com

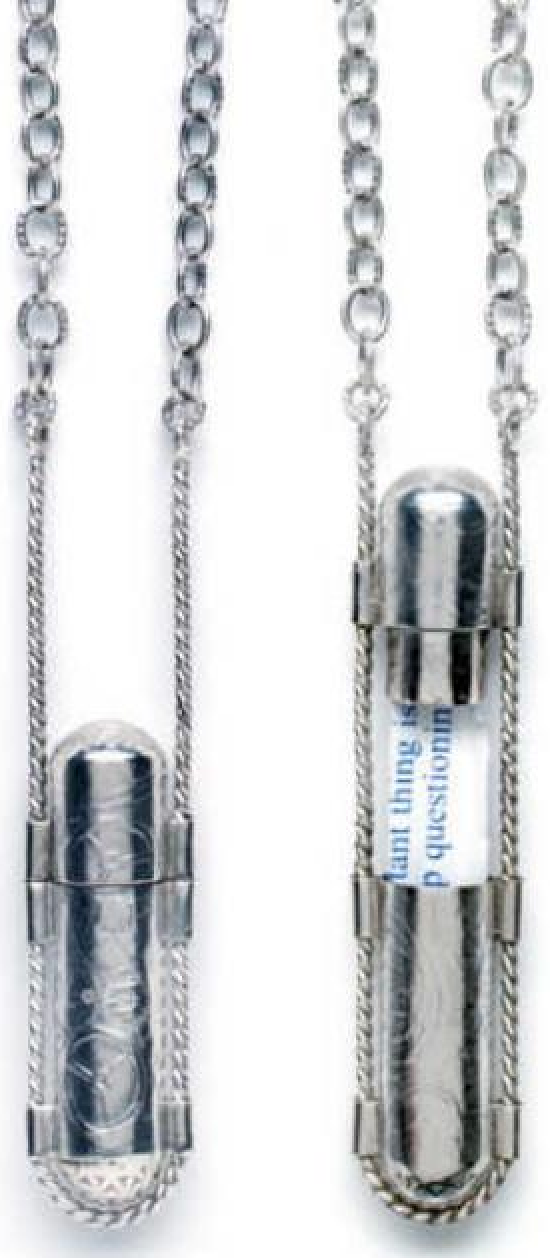
Message Tube Locket

by Marthe Roberts/Shea

Every once in a while, I get a really good fortune from a fortune cookie — a sort of "words-to-live-by" inspiration. I stuff it in my wallet, and over time, it gets so mangled and dirty that I can no longer read it. I came up with this tube design to not only protect the tiny messages but to be able to wear them when I need a little extra motivation.

Depending on the size locket you make, there's no limit to what you can hide in it. Love notes, rolled photos (printouts work best), pills, toothpicks … you decide!





BASICS & VIDEOS

Learn fundamental techniques in these bonus tutorials:	B	🎥	
Basic sawing of metal	●	●	
Roll-printing metal		●	Art+
Using shears to cut metal		●	Art+
How to file		●	
Soldering	●		
Pickle basics	●	●	
Using a disk cutter		●	
Using a dapping block	●	●	
Sweat soldering	●	●	
Straightening wire		●	
Making jump rings	●	●	Art+

B Basics, *page 75*
🎥 Videos, www.artjewelrymag.com/videos
Art+ Subscriber videos, www.artjewelrymag.com/subvideos

materials

- Sterling silver sheet: 24-gauge (0.5 mm), 3½ x 3½ in. (89 x 89 mm)
- Sterling silver tubing: 3 mm outside diameter (OD), heavy-walled, 1½ in. (38 mm)
- Sterling silver wire:
  - 14-gauge (1.6 mm), 6 in. (15.2 cm)
  - 18-gauge (1.0 mm), about 1 in. (25.5 mm)
- Sterling silver chain: 30–32 in. (76.2 x 81.3 cm)

toolboxes, *page 77*

- Sawing/Piercing
- Soldering/Annealing
- Finishing

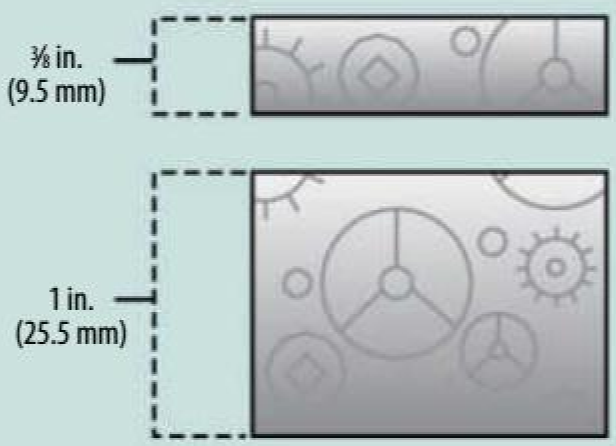
additional tools & supplies

- Rolling mill or texturing tools (optional)
- Shear: scissor-type or guillotine
- Wooden forming or swage block
- Wooden dapping block with punches
- Ball-peen hammer
- Disk cutter
- Steel dapping block with punches
- Round bezel mandrel
- Bench vise
- Draw tongs
- Half-round pliers

Find out where to buy supplies, *page 79*
See Safety Basics, *page 76*

Patinated locket, *above center*: Citrine bullet cabochons cut by John Chickadel, Pike Creek Cabochons.

TOP & BOTTOM

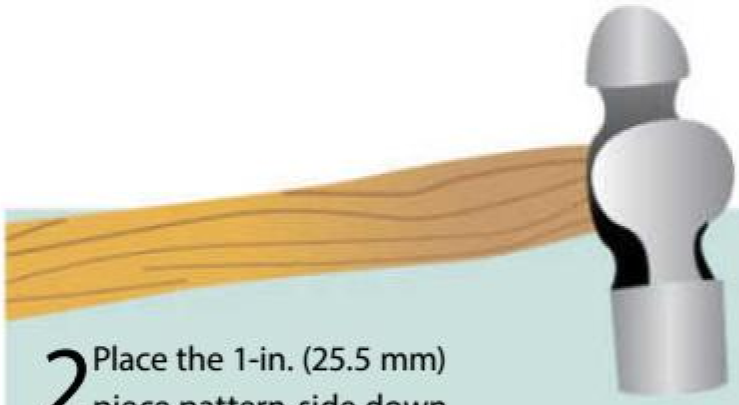


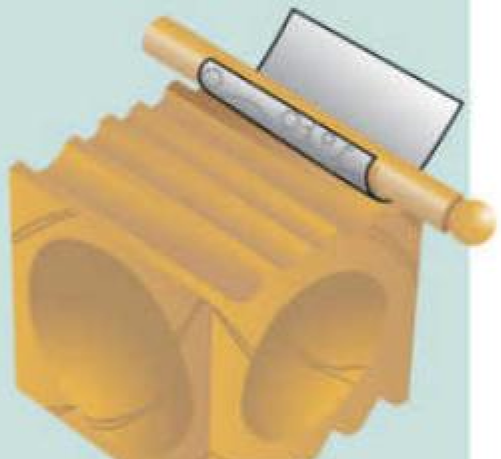
1 Use a jeweler's saw with a #2 blade to cut a 1⅜-in. (35 mm) square of 24-gauge (0.5 mm) sterling silver.

NOTE: If you want to roll-print your metal, do that before cutting the sheet to size. The metal may become skewed when you roll-print it; starting with a larger sheet than necessary (included in the materials list) will give you wiggle room to lay out the cut lines.

Use a fine-tip permanent marker to draw a horizontal line 1 in. (25.5 mm) up from the bottom of the sheet.

Use scissor-type metal shears or a guillotine shear to cut the metal at the line. This will yield two pieces: one 1 x 1⅜ in. (25.5 x 35 mm) and one ⅜ x 1⅜ in. (9.5 x 35 mm). Use a #2-cut half-round file to file the edges of each piece so they're flat and square — you'll thank me later!





2 Place the 1-in. (25.5 mm) piece pattern-side down lengthwise across a groove in a wooden forming or swage block.

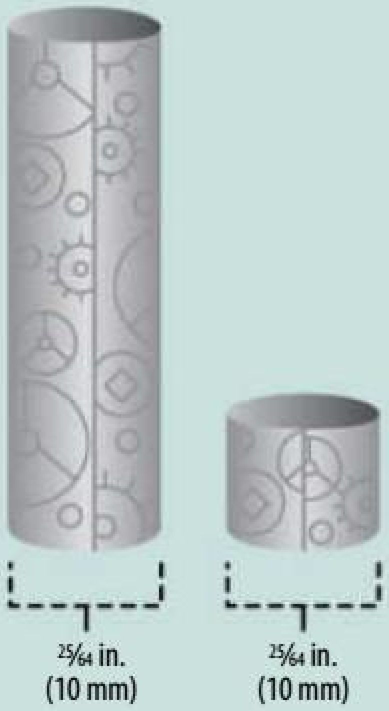
NOTE: When formed, my tube will be about 10 mm in diameter, so I used a comparable groove size.

Lay a wooden dapping-punch shank across the width of the metal in line with the chosen groove. Use the flat face of a ball-peen hammer to lightly strike one end of the punch that extends from the metal. To keep the curve even, repeat on the other end of the punch.

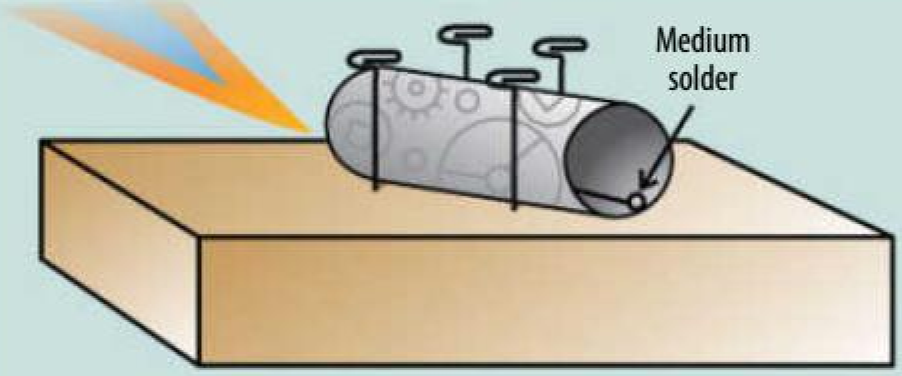
Place the metal in the next-smaller groove in the block and use different punches to refine the form. Continue to form the sheet using smaller-diameter punches until the sides of the sheet meet tightly.

NOTE: If the tube is out of round, use the shanks of the punches to help round it out.

Repeat for the ⅜-in. (9.5 mm) piece.


25/64 in.
(10 mm)
25/64 in.
(10 mm)

3 The long tube will become the bottom of the locket, and the short tube will be the top. Both should have the same diameter.

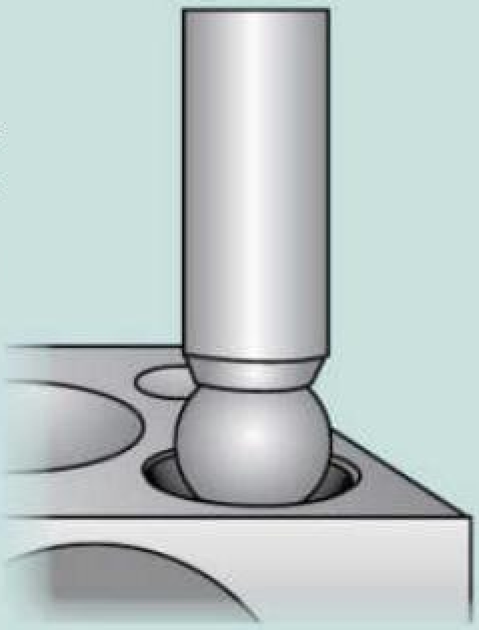


4 Lay the long tube join-side down on a soldering pad. Use T-pins to anchor it in place. Apply flux to the inside of the join. Place a pallion of medium solder on the join inside one end of tube.

TIP: Flowing the solder along the inside of a join in a hollow form ensures that solder doesn't flood the texture on the outside of the assembly.

Heat the assembly in a circular motion, then concentrate the flame near the join until the solder flows. Solder flows toward heat, so heat the tube from the end without the solder to draw it down the length of the join. Pickle, rinse, and dry the long tube. If needed, use the dapping-punch shanks as before to round out the tube.

Repeat to solder the short tube.

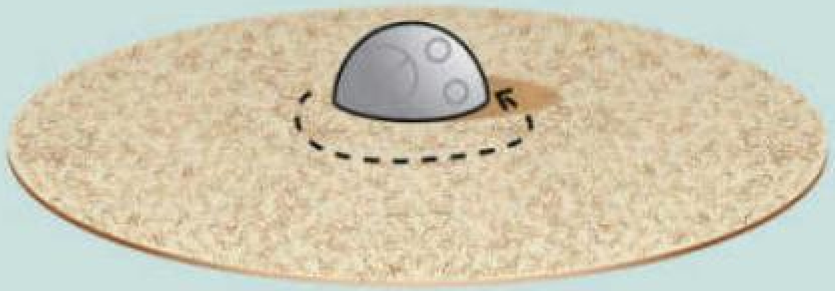


5 Use a disk cutter (with a lubricated punch) to cut two ⅝-in. (16 mm), 24-gauge (0.5 mm) sterling silver disks.

Place one disk in the 12 mm depression in a steel dapping block. Use an approximately 11 mm dapping punch (to allow for the metal's thickness) to form a hemisphere.

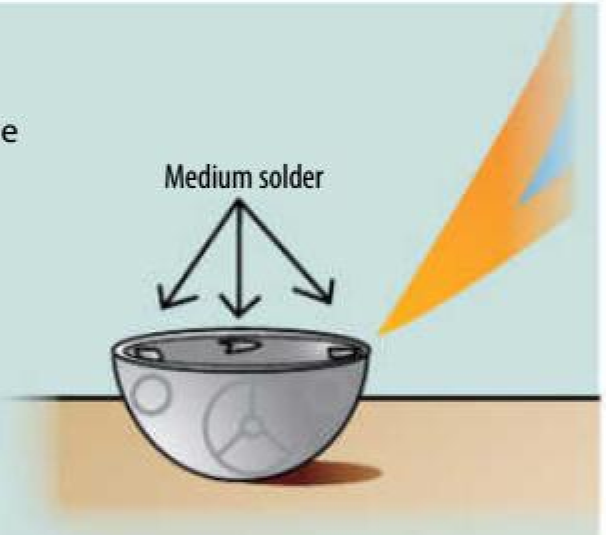
NOTE: Use a steel dapping block; the depressions are deeper than depressions in a wooden dapping block. But, be careful. Make sure to tap lightly so you don't affect the texture of the silver.

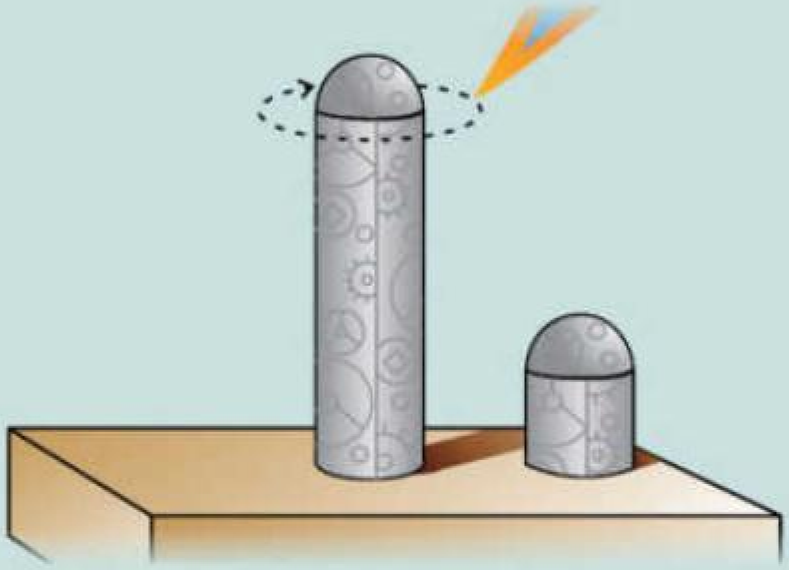
Use a 10 mm punch in the same depression to slightly tighten the diameter of the dome. Fit the dome into the 10 mm depression, and use a 9 mm punch to form a 10 mm dome. Repeat for the second disk. Check the fit against one end of the long or short tube, and adjust the size of the domes as necessary.



6 Place one dome rim-side down on 220-grit sandpaper. Move the dome in a circular motion until the rim is flush with the sandpaper. Repeat for the second dome.

7 Place the domes open-side up on the soldering pad. Apply flux, and sweat three pieces of medium solder just inside the rim of each dome. Pickle, rinse, and dry the domes.





8 Place one dome open-side down on top of the long tube. Apply flux to the join between the tube and the dome. Gently heat the assembly, keeping the flame far away from the metal.

NOTE: If you bring the flame too close, the rapidly bubbling flux may dislodge the dome from the tube.

Once the flux becomes glassy, move the torch in closer. Heat the assembly in a circular motion until the solder flows.

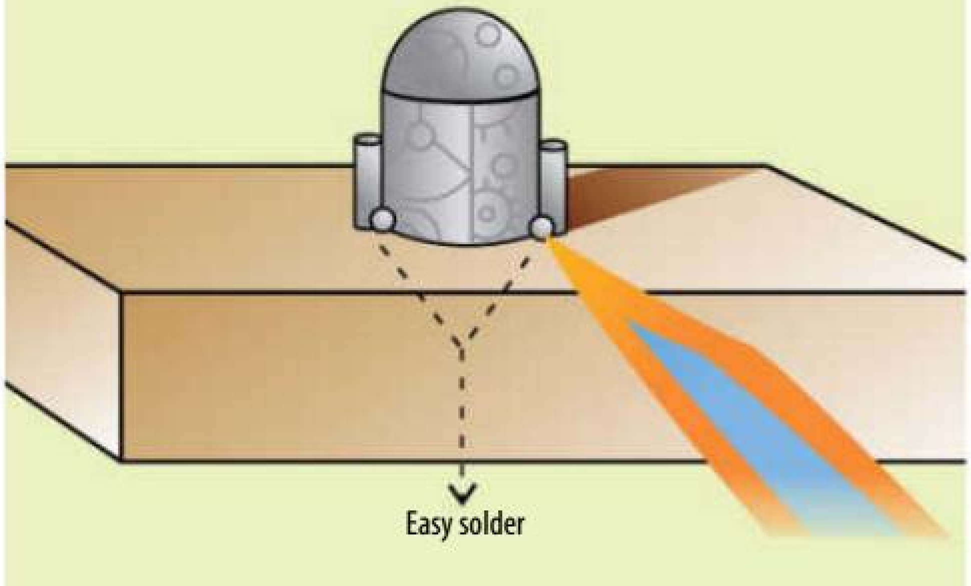
Repeat for the short tube and second dome. Pickle, rinse, and dry the assemblies.

SMALL TUBES

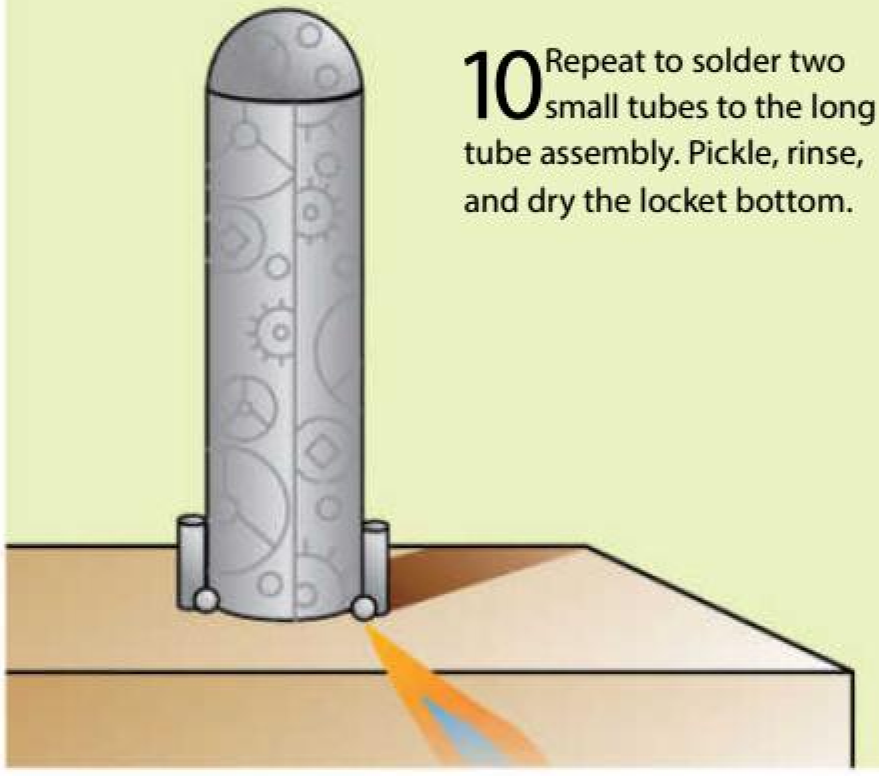
9 Cut four ¼-in. (6.5 mm)-long pieces of 3 mm outside-diameter (OD) heavy-walled sterling silver tubing (small tubes). File and sand the ends flush.

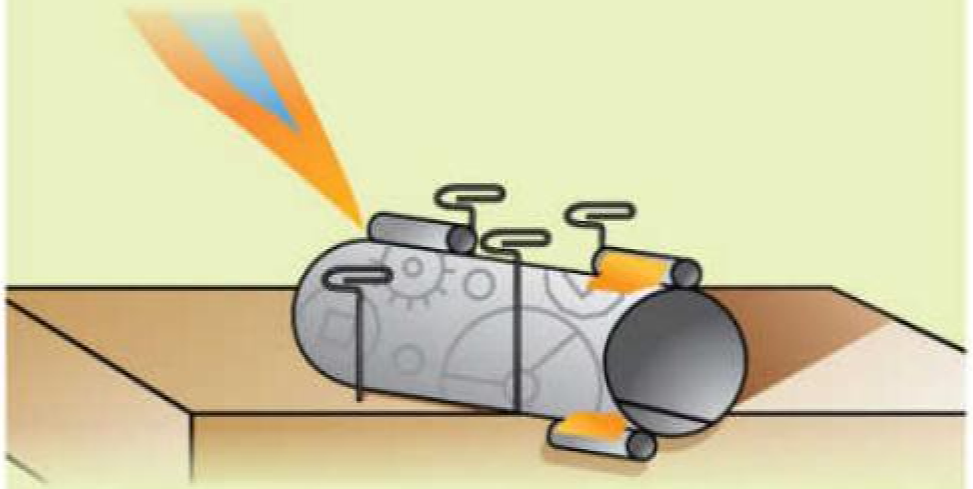
Stand the short tube assembly on the soldering pad with the join at the 6 o'clock position. Place two small tubes against the tube assembly at the 3 and 9 o'clock positions.

Apply flux, and place a pallion of easy solder at the base where each small tube touches the short tube. Heat the assembly until the solder flows. Pickle, rinse, and dry the locket top.



10 Repeat to solder two small tubes to the long tube assembly. Pickle, rinse, and dry the locket bottom.





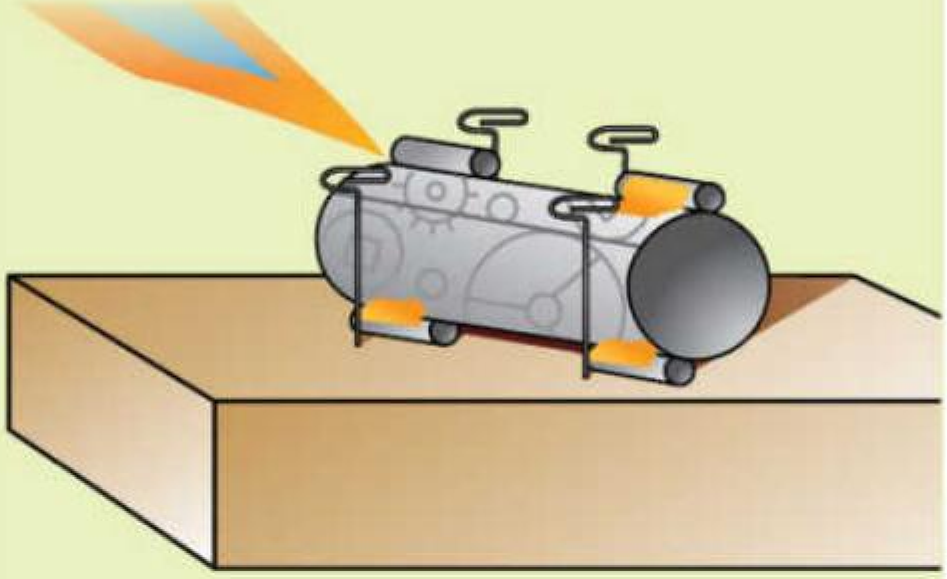
11 Use a round or half-round needle file to file a shallow lengthwise groove in the two remaining small tubes so that they will be less likely to roll off the larger tube. Sweat easy solder onto the tubes.

Use the marker or a pencil to draw a vertical line down one side of the locket bottom from one soldered small tube to where you will attach the next small tube. (Try not to draw where the solder will flow; ink and graphite can act as a resist when soldering.)

Paint yellow ochre on all joins to prevent the solder from reflowing. Use T-pins to position the locket bottom on the soldering pad. The two previously soldered small tubes should extend beyond the edge of the pad (to allow the assembly to lie flat) and align vertically to prevent the next small tube from rolling off.

Place one small tube on the lower end of the locket bottom on the marked line. Apply flux to the join. Heat the area around the assembly; direct flame will make the small tube jump off. Once the flux becomes glassy, heat the piece in a circular motion until the solder flows. Pickle, rinse, and dry the assembly.

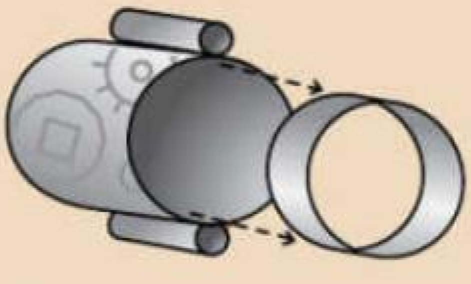
NOTE: If the small tube is out of alignment, reheat the assembly and reposition the small tube with a soldering pick. Don't press, just lightly push it with the pick.



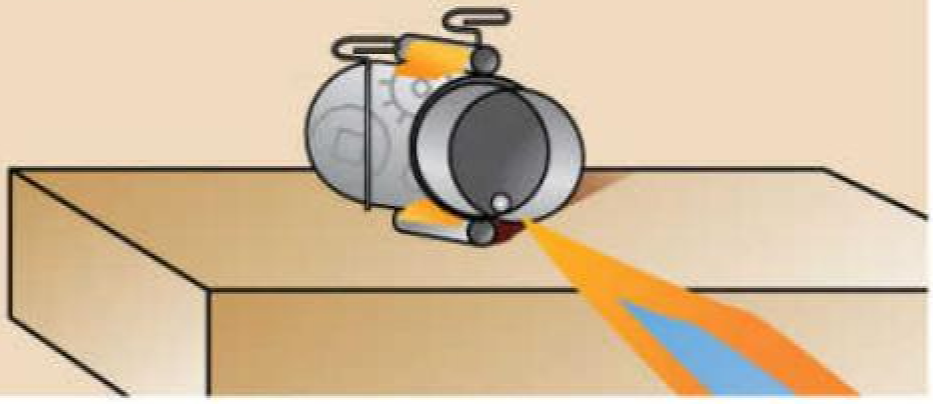
12 Rotate the assembly so the side with the two small tubes rests on the soldering pad. Secure the piece with T-pins, and paint yellow ochre on the soldered joins. Solder the final small tube in place. Pickle, rinse, and dry the locket bottom.

COLLAR

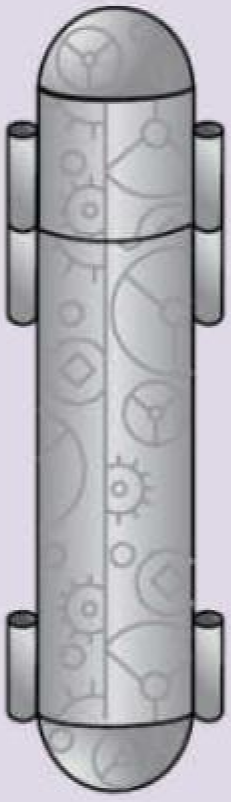
13 Cut a ¼ x 1⅛-in. (6.5 x 29 mm) strip of 24-gauge (0.5 mm) sterling silver sheet, and use a bezel mandrel to form it into a ring. Make sure the ring fits snugly inside the top of the locket. If it doesn't, trim it and test the fit again. Solder the ring closed with medium solder, then pickle, rinse, and dry it. File off any excess solder that may prevent the collar from fitting into the top.



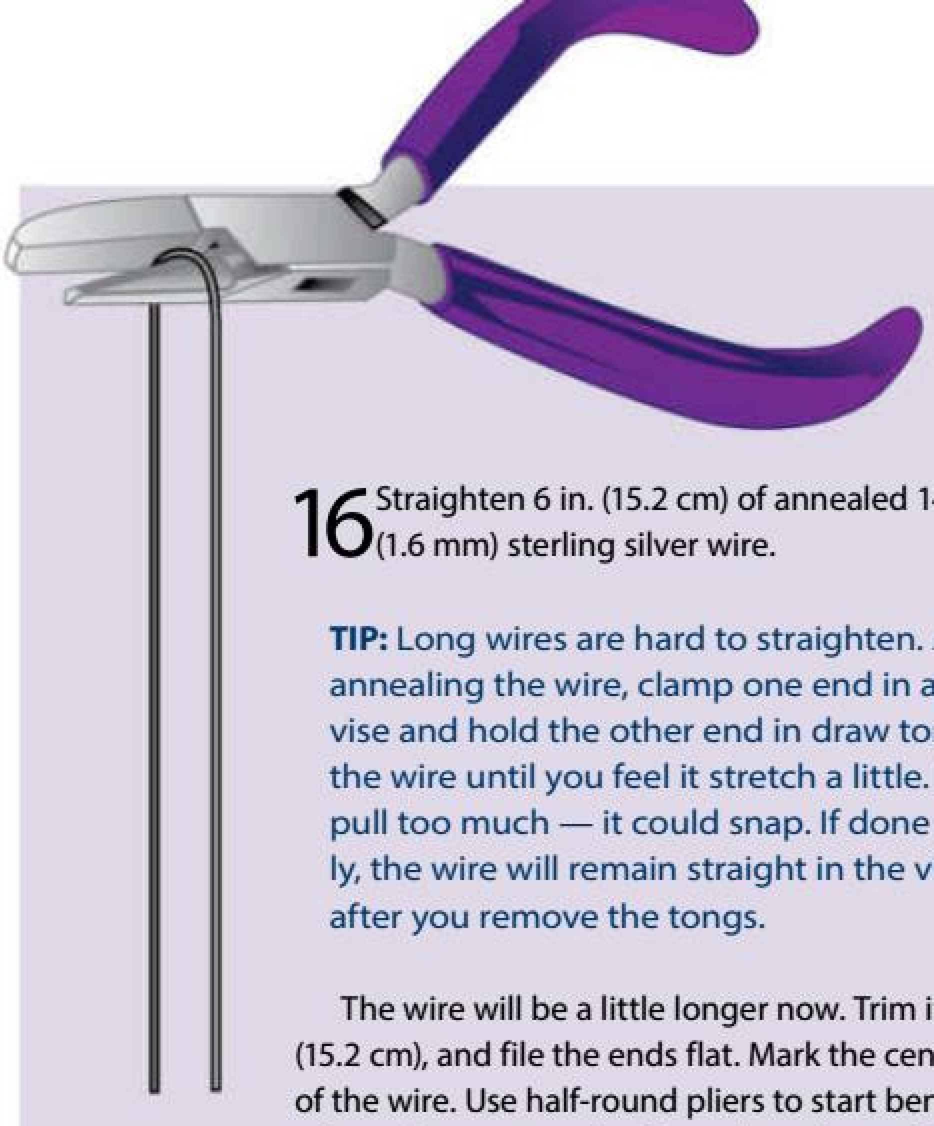
14 Insert the collar into the locket top. Most of the collar should show. Coat prior solder joins with yellow ochre. Apply flux to the join, and place a small amount of easy solder on the inside wall of the top, leaning against the inside edge of the collar. Heat the assembly until the flux turns glassy and the solder flows, periodically concentrating on the collar. Pickle, rinse, and dry the locket top.



ASSEMBLY



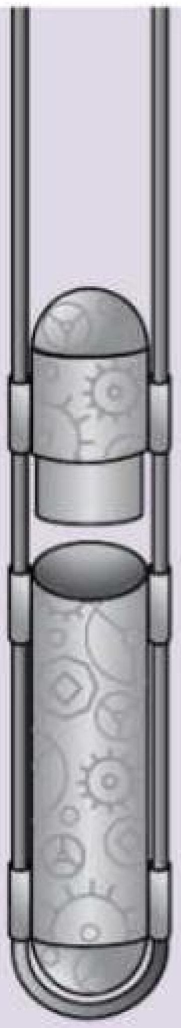
15 Fit the top and bottom of the locket together. If the fit is snug — great! If it's too tight, sand the collar until it fits. If it's too loose, use a straight burnisher at about a 20° angle to burnish the collar outward a little at a time. Burnish, test the fit, and repeat as necessary.



16 Straighten 6 in. (15.2 cm) of annealed 14-gauge (1.6 mm) sterling silver wire.

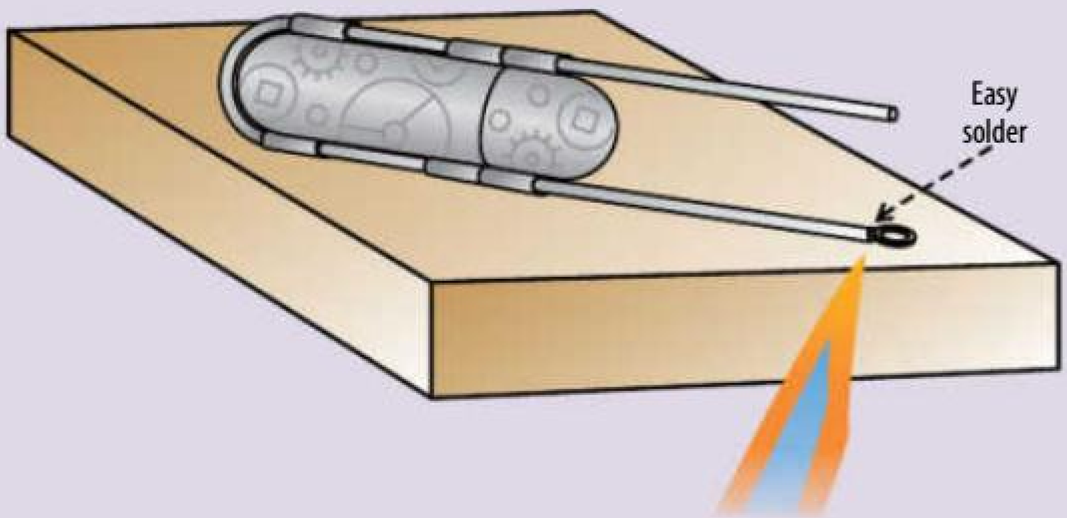
TIP: Long wires are hard to straighten. After annealing the wire, clamp one end in a bench vise and hold the other end in draw tongs. Pull the wire until you feel it stretch a little. Don't pull too much — it could snap. If done correctly, the wire will remain straight in the vise even after you remove the tongs.

The wire will be a little longer now. Trim it to 6 in. (15.2 cm), and file the ends flat. Mark the center point of the wire. Use half-round pliers to start bending the wire at the center point. Form the wire until it follows the curve of the dome on the bottom of the locket and the legs of the wire are parallel.



17 Thread the wire through the small tubes on the sides of the locket. There should be at least 2 in. (51 mm) of wire above the locket to allow room for placing things in the locket when it's open.

Slide the top up and down the wire, and make sure the collar fits tightly into the bottom. It's all right if the sliding motion is a little rough; it will become more fluid after polishing.



18 Use 18-gauge (1.0 mm) sterling silver wire to make two ⅛-in. (3 mm) OD jump rings. Use easy solder to attach one to each end of the wire. (It doesn't matter if the jump rings are parallel or perpendicular to the locket, as long as they both face the same direction.)

NOTE: The jump rings will be used to attach chain to the locket, and act as a stop to keep the locket top from sliding off.

Use easy solder to attach a sterling silver chain to the jump rings. I like a long chain for this locket (30–32 in. [76.2–81.3 cm]). It's easier to open, close, and see what's inside the locket when it hangs lower on the body.

Polish or patinate the locket as desired. (I used a 1-in. [25.5 mm] muslin buffing wheel and rouge with a flex shaft.) AJ

Marthe Roberts/Shea's work has been shown in galleries nationally and has appeared in Art Jewelry*'s Gallery. She teaches jewelry making at the Cheltenham Center for the Arts (Cheltenham, Pa.) and the Main Line Art Center (Haverford, Pa.). She is also the president of the Pennsylvania Society of Goldsmiths. You can reach her via her website, www.jewelrybymars.com.*

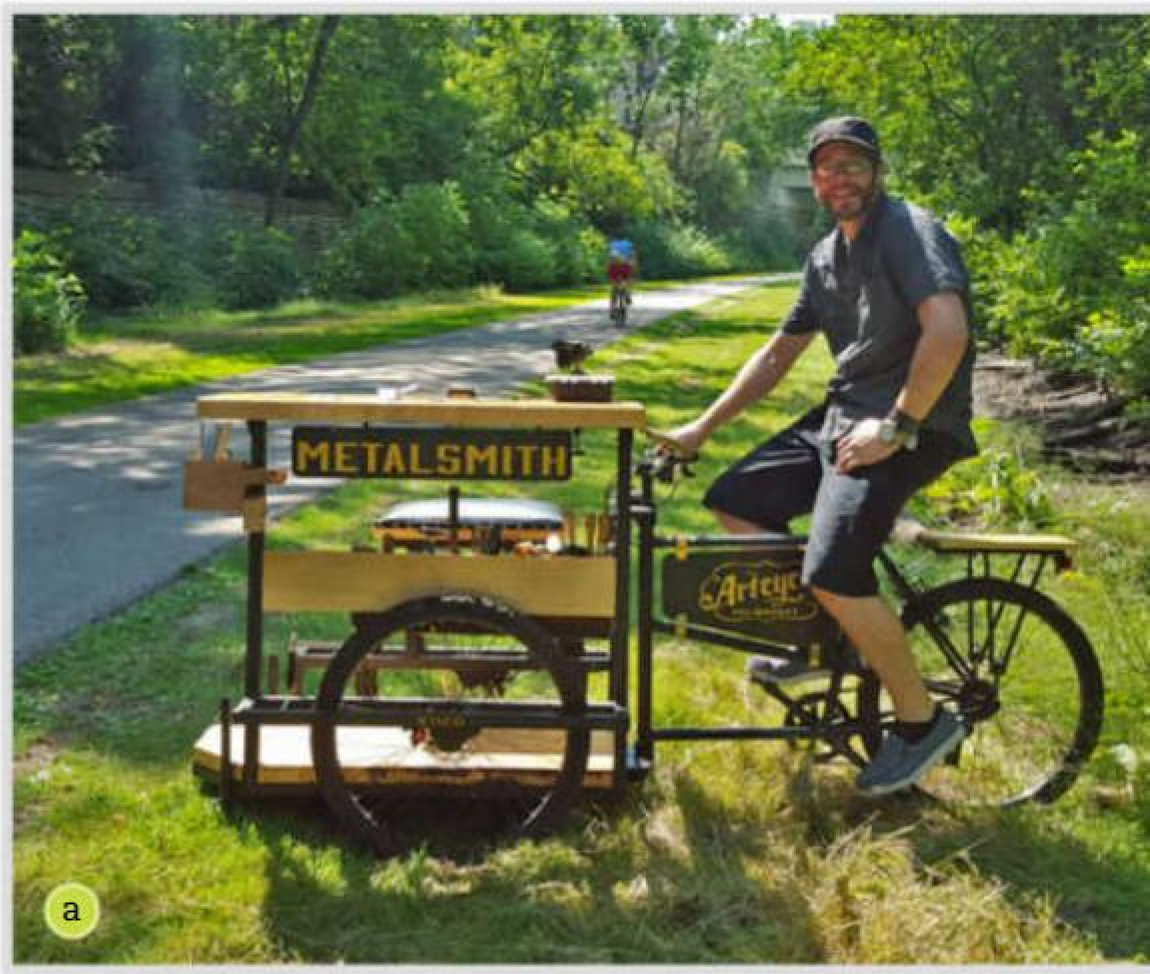
Illustrations by Marthe Roberts/Shea.

When CRAFT and BIKES COLLIDE

Discover what happens when two makers join forces to build Milwaukee's first jeweler's bench on wheels.

by Annie Pennington

WHAT IF YOU COULD TAKE YOUR JEWELER'S BENCH outside, set it up wherever you wanted, and involve the public in your process? Michael Dale Bernard and Rachel Andrea Davis turned that idea into a reality. What began as an offhand comment evolved into a university-funded research project to bring the art of metalsmithing to public spaces in Milwaukee.



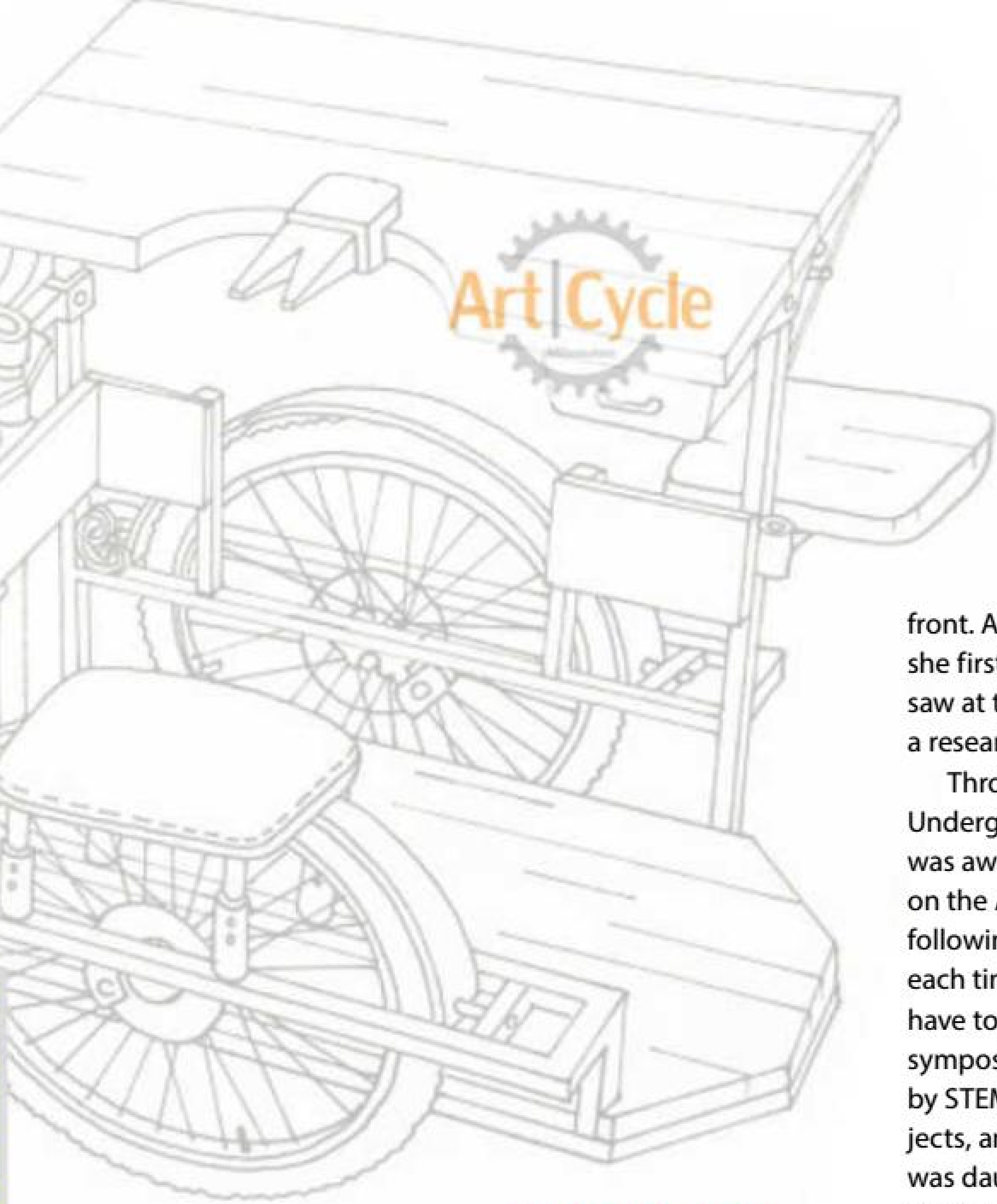
And so it begins

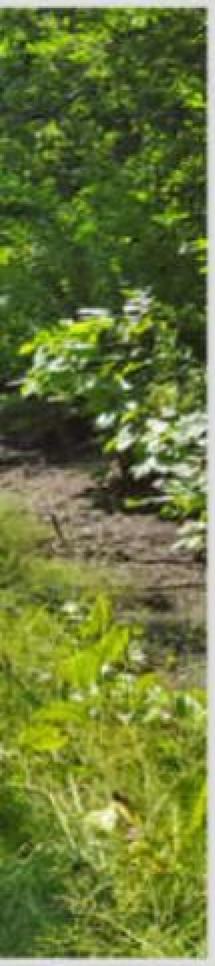
"I want to do something like that." While making 400 brooches for the 2013 SNAG (Society of North American Goldsmiths) Conference, Michael Dale Bernard and Rachel Andrea Davis watched two craft-advocacy videos by Gabriel Craig (see "Video Advocacy," *page 64*). In the performances, Craig advocates for handmade craft, either by engaging the public with a jeweler's bench in the city or by taking on the role of a sidewalk evangelist to preach the gospel of craft. An idea was born: Could they build something that takes the jeweler's bench to the public, rather than asking the public to come to them?

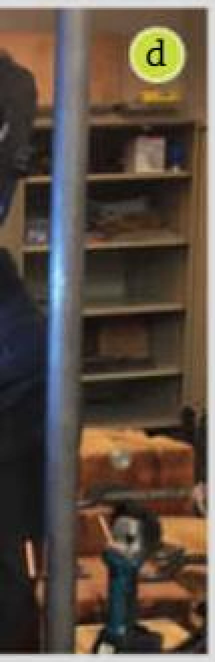
The proposal

Bernard, Adjunct Assistant Professor at University of Wisconsin Milwaukee (UWM), originally hails from Los Angeles, where there's a huge food-truck and bike scene, so he already knew of the connectivity that bikes can create in a community. But it was a trip to Mexico that opened his eyes to what was possible. While in Mexico City, he saw thousands of mobile businesses. Instead of traditional brick-and-mortar stores, bikes were the storefronts. He wanted to expand upon that idea by bringing a jeweler's bench to the public **[a]**.

Bernard presented Davis, one of his undergraduate students, with a brass bicycle bell **[b]** and asked if she'd help him build a bicycle with a jeweler's bench on the







front. After getting the initial giggles out of the way — she first envisioned someone trying to ride a bike and saw at the same time — Davis said yes, and applied for a research grant.

Through the highly competitive SURF (Support for Undergraduate Research Fellows) program at UWM, Davis was awarded a grant to allow her to work with Bernard on the ArtCycle for one semester (she reapplied for the following two semesters, and was awarded the grant each time). At the end of the grant period, Davis would have to present the ArtCycle at a university-wide SURF symposium. The symposium was historically dominated by STEM (Science, Technology, Engineering, Math) projects, and the prospect of being a lone arts-related voice was daunting. But there was time to think of that later. Right now, it was time to get to work. Armed with two mountain-bike frames, fully stocked metals and woodworking studios, and the desire and tenacity to make this happen, they set off to design and fabricate what would become Milwaukee's only mobile jeweler's bench.

"We believe in art and the way it can activate people in a community. ArtCycle infuses this spirit into the already strong Milwaukee bicycle culture."

—Rachel Andrea Davis and Michael Dale Bernard

The build

What's the recipe for an ArtCycle? Two bike frames (a gaudy black-and-purple Schwinn and a hunter-green Mongoose), technical drawings and templates, a custom steering tube, lots of steel and wood, some killer bearings, more than enough welding practice, and loads of grinding and finishing. Oh, and 18 months to work on it.

The first step was to splice the two bicycle frames into one. They used strong magnets to determine the layout of the bike frame, and then welded it together (magnets would prove to be key in laying out and fabricating the trike). Next, they designed the bench frame and seat **[c]**. Of course, when you're designing anything from scratch, miscalculations are bound to happen. After welding the bench frame, they discovered it was too large to fit through the studio door, so they chopped it apart and re-welded it. Hey, it's a teachable moment, right?

One of the most challenging parts, says Davis, was learning the bicycle mechanics. While she knew basic bicycle maintenance, Bernard was mostly in charge of adapting traditional bike mechanisms to a from-scratch, not-available-at-stores reverse tricycle. He taught her about the inner workings of a bicycle as they worked.

The design and frame fabrication continued **[d, e]**, and (after some ballet-like arm motions to determine

Learn more about the ArtCycle at **www.artcyclemke.com**.

the shape of the cutout in the bench top for the bench pin **[f]**), they determined what the top of the bench would look like. They chose to make a drop-leaf top so that it could fit through doorways but also be opened to provide additional working space.

After months of working on the ArtCycle and only having a collection of pieces and parts to show for it, it was hard to believe the trike was going to come together. The final steps were to paint the frame, attach the wheels **[g]**, fabricate the handlebar (partially made from brass sink pipes donated by Davis' father), add the bench top, the floor boards, the kickstands, and the brackets for the canvas tool roll that would secure the needed metalsmithing tools while the bike was in motion.

Once the final day of assembly came, the pressure was on. Davis was tasked with making the seat. She used particleboard, upholstery foam and tacks, black vinyl, and some help from Kevin Giese (Associate Lecturer and Woodshop Lab Technician at UWM) to make a wooden rim for the seat. Once the seat was mounted, it was time to add the finishing touches and take it for a test ride. The ArtCycle was finished!

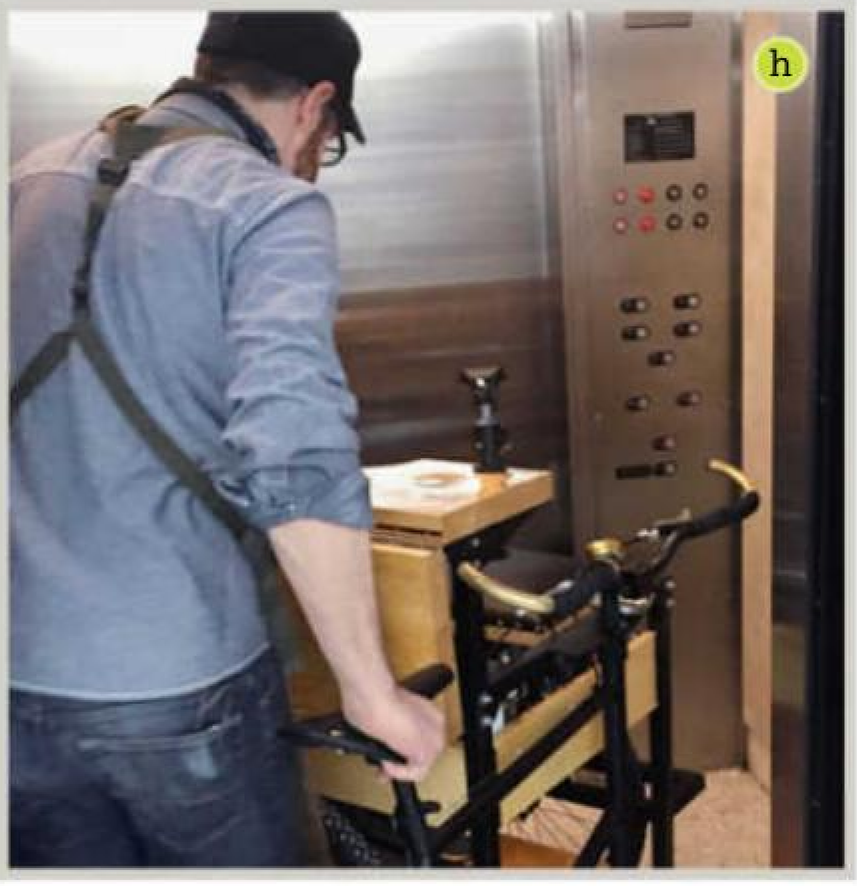
The presentation

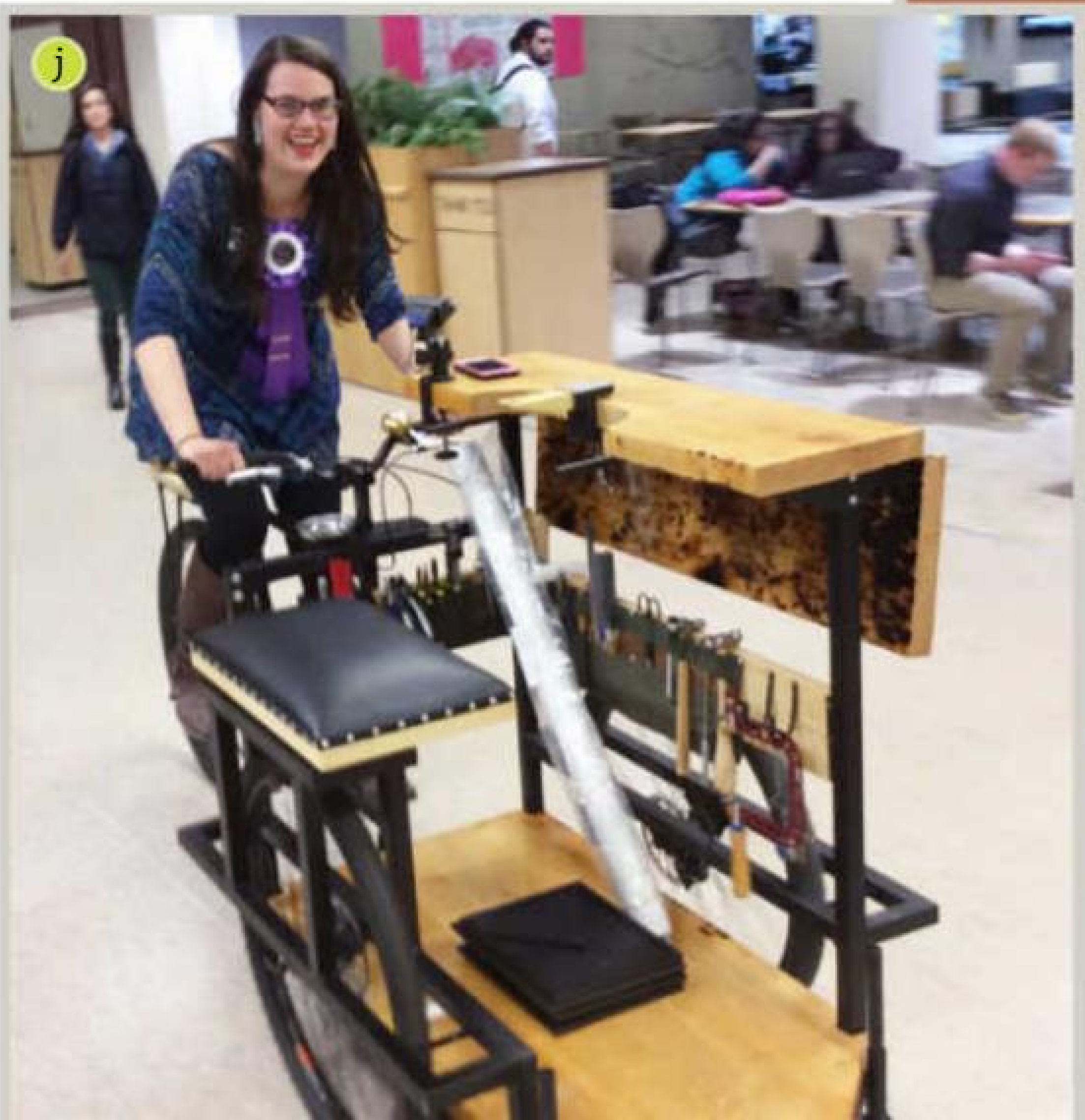
After strategically maneuvering the ArtCycle into the elevator **[h]** and riding it through the UWM Union, Rachel presented the ArtCycle to the SURF committee on an afternoon in April 2015. Though her hands were ice-cold and shaking, she made it through the presentation. At the end, she even rode the ArtCycle around the room while answering questions about how the brakes worked and how it turned. That's when she saw it really click with people. "It's one thing to see the creation and listen to someone talk about it, but there's a different level of understanding that comes from seeing it in action."

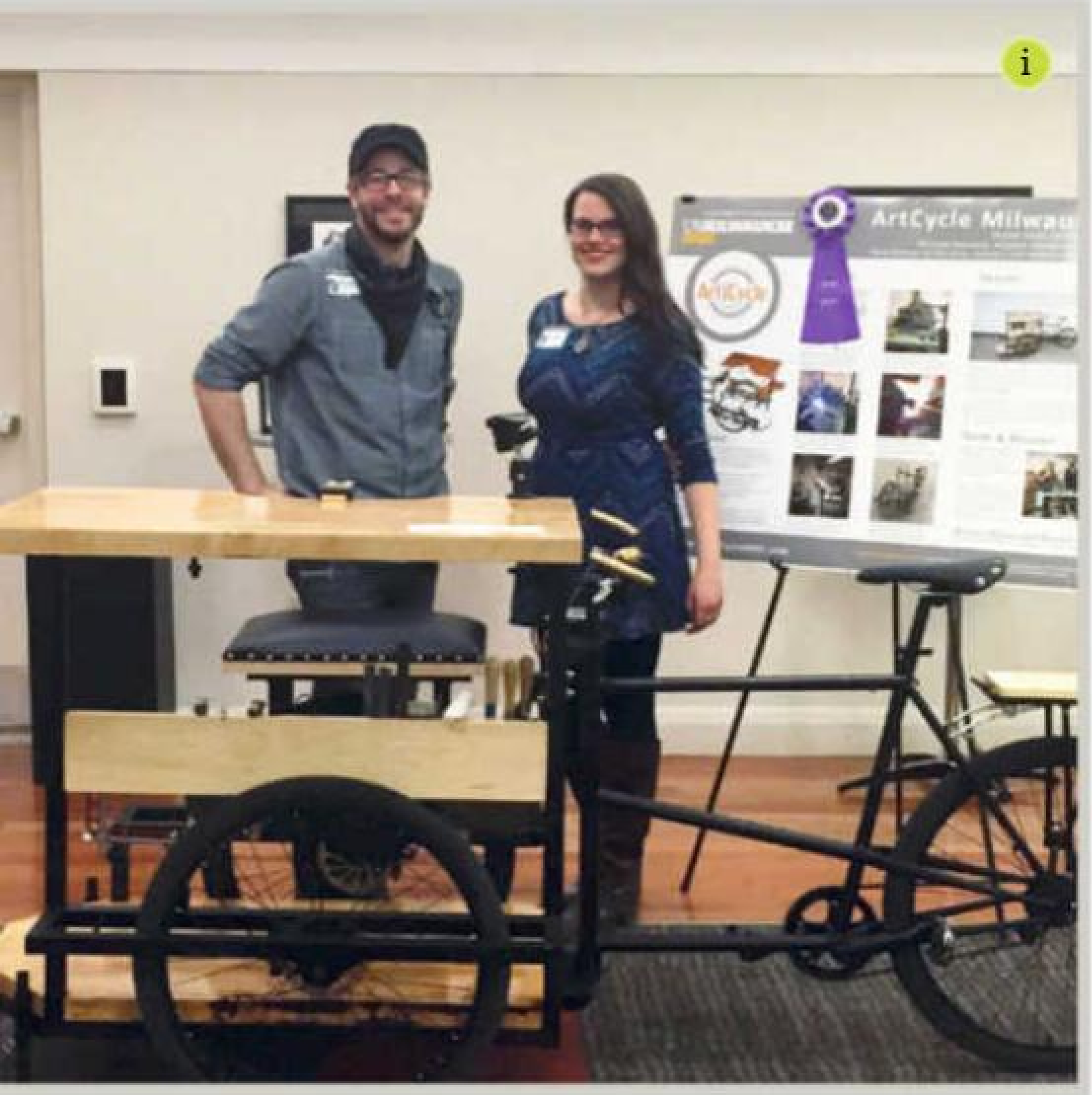
Davis and Bernard didn't expect anything, but attended the awards ceremony anyway. And it's a good thing they did! As the only arts-related project to win an award **[i]**, they were ecstatic, and Davis took the ArtCycle for a celebratory spin **[j]**. After putting a year and a half into creating the ArtCycle, it was refreshing to have other people see it and believe in it, too.

Out and about

Davis and Bernard have taken the ArtCycle to the streets of Milwaukee many times since then (though, now that Davis has moved 500 miles away for grad school, Bernard is the ArtCycle wrangler). Bernard rode the ArtCycle to many venues throughout the summer and fall of 2015,







Photos c–j courtesy of ArtCycle.

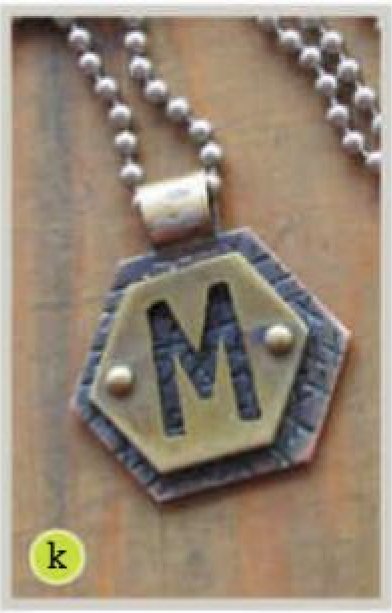


Photo by Casey Sheppard, www.caseofthenomads.com.

> "From the beginning, ArtCycle has been about interaction with the community in order to educate people about making. A funky-looking tricycle gets a lot of stares, and in Milwaukee, people have no problem coming up to someone and asking questions about a bike."
>
> — *Rachel Andrea Davis*

including farmer's markets, craft events, and Maker Faire Milwaukee. At over 250 lbs., and looking like something most people have never seen, the ArtCycle always draws a crowd.

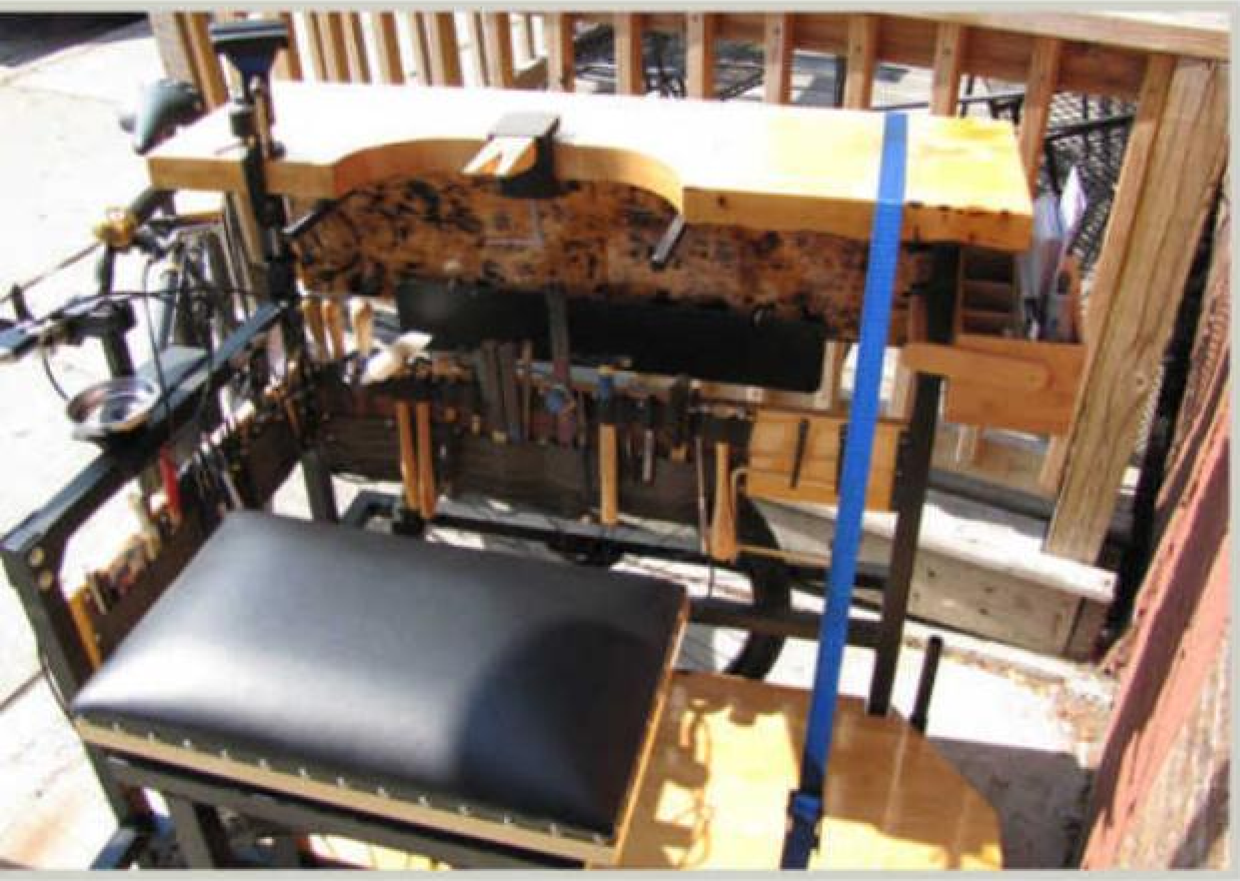
The main goal is to interact with the community and educate people about what metalsmithing is, and what handmade jewelry is. Most people have never seen a jeweler's bench, much less had the chance to see how a piece of jewelry is made.

Bernard distributes fliers for UWM workshops, information about the ArtCycle, and — here's what really gets people involved — he makes spectators a monogrammed pendant **[k]** while he talks to them about what this project is and why he's doing it. Using textured brass and copper, Bernard pierces and rivets a simple pendant, giving the public a peek into the jewelry-making process. For anyone whose idea of jewelry is what's available at the mall, seeing someone make a piece of jewelry from scratch gives an appreciation for what goes into making a piece of jewelry by hand.

Bernard sometimes even lets folks work on a pendant themselves **[l]**. In this way, he's not just telling people about metalsmithing and jewelry making; he lets them get their hands dirty and see what it's like to be a maker. One boy stands out in Bernard's recollections:

"One weekend this past summer, I had the ArtCycle out at the Riverwest farmer's market. A young man named Dennis approached as I was working on a pendant. He was 12 years old, very shy, but also very interested. He observed me working for at least 10 minutes, and then I asked if he wanted to help me make a pendant for him next. He said yes, we introduced ourselves, and we started working on an ornate letter-D pendant. He helped by drawing out the letter to be pierced, filing, sanding, and setting the rivets. As we worked, he told me he was at the market helping his grandmother, Dee, who sells jars of homemade relish, pickles, and various salsas. When we finished his pendant, he said thanks and ran off to show his creation to Dee.

"He soon returned, and quietly said that he would like to make another pendant to surprise his grandmother. This time around, he did most of the labor. We traded spots, he sat at the ArtCycle bench, and I taught



> “By bringing art out into the streets, we are able to reach an entirely different demographic than in the art galleries. We think of it as a grassroots attempt to reveal the joy of working with your hands.”

him how to use the jeweler’s saw and the manual crank drill to start piercing. He was so proud of his creation. I was soon after awarded a fabulous jar of homemade corn salsa by a very proud grandmother!”

This type of interaction is what the ArtCycle is all about. Davis and Bernard explain, on the ArtCycle website; “By bringing art out into the streets, we are able to reach an entirely different demographic than in the art galleries. We think of it as a grassroots attempt to reveal the joy of working with your hands.”

The takeaway

When asked what she gained personally from the project, Davis was quick to reply. In addition to becoming competent at MIG welding (and learning how to change the tubes on her own bike), she got an inside look at what it is like to be an educator and an artist. Bernard is a full-time professor, the UWM studio technician, has his own studio practice, and still made time to work with Davis on ArtCycle. She learned the importance of maintaining a life-work balance, however delicate it may be, and saw how being able to prioritize tasks is everything.

As the closing statement from Davis’ SURF presentation, she relayed the most important lesson she learned: “If you put your mind to it, you can build anything — even a bicycle with a jeweler’s bench on the front.”

Rachel Andrea Davis: www.rachelandreadavis.com, radmetalsmith@gmail.com

Michael Dale Bernard: www.michaeldalebernard.com

video advocacy

Two craft-advocacy performances by artist/activist Gabriel Craig spurred Bernard and Davis to create the ArtCycle.

- **PRO-BONO JEWELER:** In this series, Craig took his bench outside every week for a month to share handmade jewelry with the uninitiated. He gave away silver rings, but people had to participate to receive one. He’s taken this combination of jewelry and performance to the streets in three states. It’s a reminder of how exciting it is to discover the making process.
- **THE GOSPEL ACCORDING TO CRAFT:** This performance piece took place in Richmond, Va. Craig used the form of sidewalk religious preaching to share craft with a wider audience. Intending to attract and repel, and to capture onlookers’ instantaneous response, he forces people to reconsider their expectations when faced with a man speaking from a pedestal.

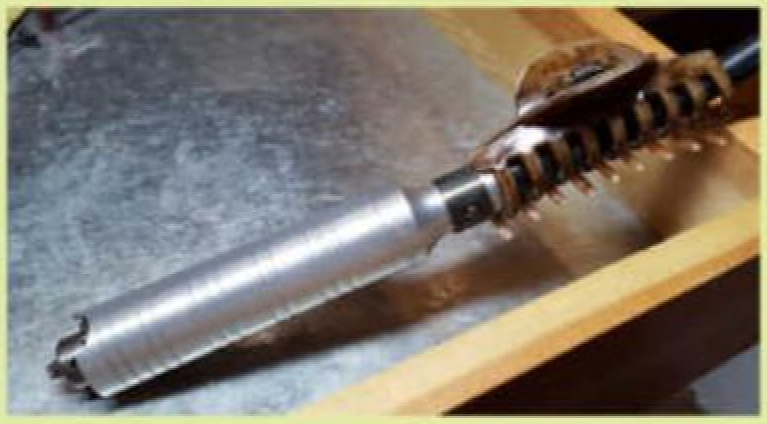
To watch Craig’s performances, visit **www.gabrielcraigmetalsmith.com**.

ASK THE ARTIST: ANNIE PENNINGTON

What studio mistake have you learned the most from?

“The biggest learning experience I’ve had didn’t happen to me. A friend of mine forgot to tie her hair back *one* time, and leaned in too close to the flex shaft while she was using it. She lost a large chunk of hair, and she’s lucky her scalp stayed intact! I used to keep a hair tie on my bench, but now, I keep a hair clip on the flex shaft itself. It’s loose on the shaft, so it knocks against the handpiece. I see, hear, and feel it every time I grab the handpiece, and I’ve yet to forget to keep my hair pulled back.”

Contact: www.anniepennington.com



Depletion Gilding vs. Depletion Silvering

Gain a deeper understanding of the technique of leaching copper from the surface of silver alloys.

Keum boo beads by Patricia Tschetter; reticulated cuff by Karen J. Lauseng.

by Annie Pennington

Depletion gilding. Raising the fine silver. Depletion silvering. All are used to describe the same process, but one is more accurate than the others. And here's why.

To "gild" is to cover something with a thin layer of gold. "Depletion gilding" is the removal of other metals from the surface of a gold object, leaving a richer-gold layer on the surface. Since the term "gilding" specifically refers to *gold*, the process of removing copper from the surface of a *silver* alloy would more accurately described as "silvering." Now, I realize the usage of "depletion gilding" when referring to silver will continue (even though I wish it wouldn't); I just want to make you aware of the distinction.

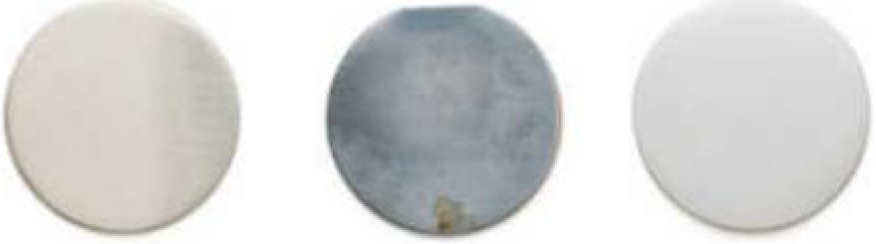
The same goes for the phrase, "raising the fine silver." It may seem that you've brought the fine silver in the alloy to the surface, but you haven't. You're not so much elevating the fine silver as you are getting rid of the copper, leaving the fine silver behind.

The what and why

Depletion silvering is accomplished by repeatedly heating silver alloys to oxidize the copper at the surface, and then removing the oxides (cupric oxide, a.k.a. firescale) with acid (pickle). For some decorative techniques, you need a fine-silver surface that won't oxidize. But, because of the softness of fine silver, sterling silver is often a better choice because it's stronger. To get the best of both worlds, you can depletion-silver the sterling silver.

When not to do it

While you might be tempted to use this process to hide firestain (cuprous oxide), don't do it! Depletion silvering leaches out copper oxides from only the outermost atomic layers, leaving a fragile, porous finish. If you were to sand or even polish the depleted surface, you'd work through the fine silver and expose the firestain. Even if you don't polish it, the fine-silver surface is now softer than the rest of the alloy, and so is more susceptible to damage and being rubbed away over time. The best solution is to prevent firestain in the first place by using a barrier flux, such as Prip's or other fire coat.



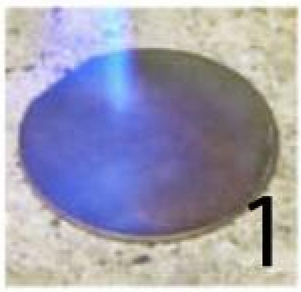
Left to right: Unaltered sterling silver; sterling silver that's been heated and oxidized (the gray firescale will be removed with pickle); properly depletion-silvered sterling silver — it remains matte-white when heated, and no oxides develop.

How to

Place a sterling silver (or other silver alloy) object on a soldering surface. Use a soft, bushy flame to heat the silver evenly to close to the annealing temperature (dim the lights so you don't overheat the silver). Pay attention to the dark gray copper oxides that form on the surface **[1]**.

NOTE: You can heat the silver only until the surface oxidizes, but you may need to repeat the process more times. Don't overheat the silver, or it may become brittle and less ductile.

Allow the silver to cool slightly, quench it in water, and place it in pickle to remove the oxidization. Rinse the silver in water, brush it with a soapy brass brush (if desired), and dry it. Repeat this process many times until the silver no longer oxidizes when it's heated (usually 5–15 times). The more times you repeat the process, the thicker the fine silver will be at the surface. Photo **[2]** shows the silver being heated for the third or fourth time. Oxides still form, but they're not as prevalent as after the first heating. The final photo shows what you're looking for in a properly depleted surface: pure matte white with no oxidation **[3]**.



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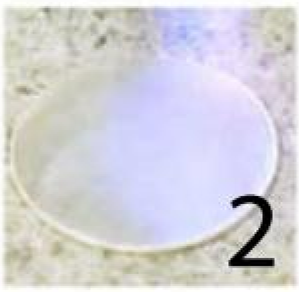

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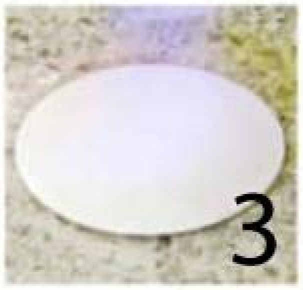

3

when to use

Here are a few techniques in which depletion silvering is necessary, if you're working with sterling silver:

- Keum boo
- Reticulation
- Granulation
- Enameling
- Applying gold metal-clay slip or paste

Neycraft
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Join the Makerspace

Get involved with the newest way to share unexpected

by Kristin Sutter

Movement!

ideas, skills, and gear with fellow makers in your community.

Opposite page: The Columbus Idea Foundry (CIF) in Columbus, Ohio, is a hive of activity, with demonstrations, including silver casting (top left) and pewter carving (top right). At left, a CIF-resident small business, Bigger Tuna, helps inventors take their ideas to market. Photos courtesy Columbus Idea Foundry.

This page: A member of the Philadelphia makerspace, NextFab, at work in the jewelry space. Photo by Anders Uhl.

What do you get when you take all kinds of craftspeople, engineers, and tinkerers and put them together in a room with a bunch of tools, hardware, and raw materials? Probably some innovations that would make Dr. Seuss proud. And that's just what a makerspace — whether it's a portable supply cart, a nook in a library, or a 5,000-square-foot former industrial facility — is for. More than a space, it's an idea.

What's a makerspace?

Think of a makerspace as a wonderland for people looking for “a spark of inspiration, a fresh angle,” says Goli Mohammadi, the first editor of *Make* magazine. Make Media, the umbrella for the magazine and the Maker Faire conventions, has been a force in the growing tech-influenced maker movement, which celebrates hands-on creativity, innovation, and collaboration. Makerspaces are a vital part of that movement. Going to a makerspace, Mohammadi says, is like “going to a gym, but for making. You might be pushed to stay on that treadmill a little longer because you're around people who are doing the same thing.”

That “same thing” is, of course, making. But that's where the sameness ends. It's impossible to estimate how many makerspaces there are in the United States, because there's no strict definition of what a makerspace is. Some are nonprofits run by their members; some are for-profit ventures. Often, community organizations, libraries, and museums, champion these spaces. Some are geared toward youth; some are community-wide affairs. Some are called “labs,” “hackerspaces,” or “shops.” Some have permanent homes, while others are mobile, and set up wherever they are welcomed.

The tools and equipment you'll find at a makerspace also vary, as does the collection of talents in any given location. Woodworkers and jewelry makers might have a station down the hall from a robotics engineer or an animator. One of Mohammadi's favorite collaborations was between a botanist and a roboticist. They made a mini garden that walked around trying to get people to water it. “Makerspaces allow people who are into one medium to be exposed to many others, some of which they may have never known about,” she says.

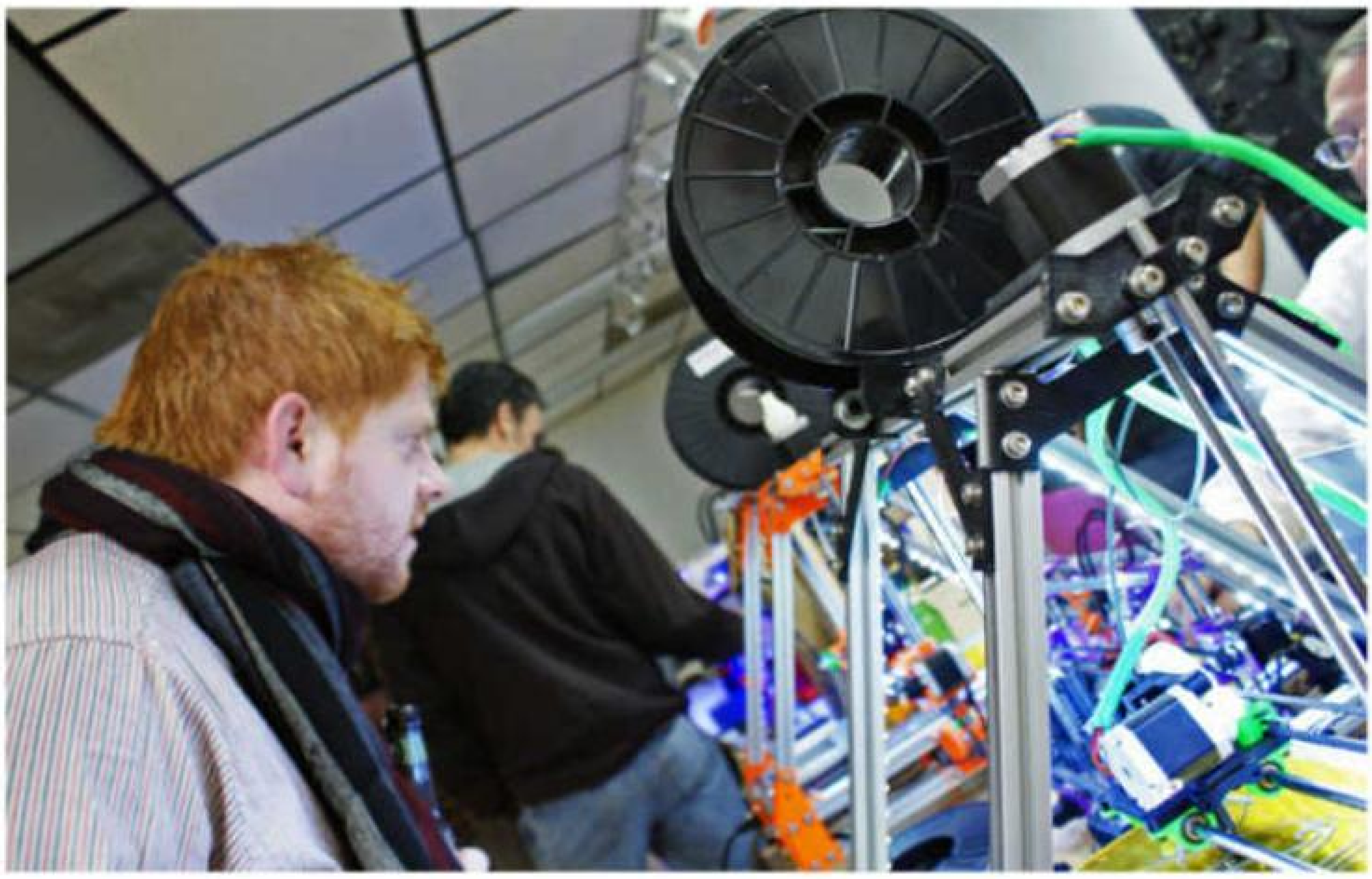
Jewelry maker Jon Hughett is a member of Milwaukee Makerspace, which has around 170 members. He says being there has expanded his world. To help stock the jewelry station, he spent $25 to buy a watchmaker's bench without drawers. “I figured that was my tuition for learning how to make drawers.” He also built a four-station jeweler's bench. In return for being shown how to use the blacksmith's forge to make pendants, he helped the resident blacksmith make a wax pattern for an engagement ring. He also guided another member through making a Halloween-costume badge, and is working with a machinist on a homemade hydraulic press.

For Hughett, the space is a “cooperative-building social club” that he can access 24/7; he frequently heads there when he can't sleep. “You make a lot of friends, you learn a lot of tricks and techniques,” he says. “Who knows? Maybe one day I'll make a catch differently because some guy in the machine shop made a little widget and I paid attention.”

Kaila Lewis joined the Houston Makerspace to get access to the equipment. She'd spent several years taking jewelry classes, but without a home studio, it was hard to practice. “I used to have to take a class or sign up at a university,” she says, “which would involve a large fee and a limited amount of time.” As a makerspace member and volunteer, she has complete access to the studio. “I've been able to make and learn so much in just a few months here.”

The “space” part of a makerspace is a huge benefit, says Mohammadi. People in cities often have small living spaces, which means that they can't work on large-scale projects — sculpture, for example — at home. Makerspaces may have open work areas as well as storage areas and mini studios. Some space is usually included

Attendees check out a variety of 3D printers at a 3D-printing user group MeetUp, hosted by the Columbus Idea Foundry, a makerspace in Columbus, Ohio. The monthly MeetUp is free and open to the public.



maker-in-residence programs

"One of the questions that people who are setting up makerspaces always ask is, 'How do I get people to share their skill set?'" says Goli Mohammadi, the former editor of *Make* magazine. She encourages them to put a call out to the community. And that's where you can step in. Many spaces have established maker-in-residence programs, where you can use studio space, help members with their projects, and innovate ways to collaborate. To learn more, check out Maker Ed's Youth Makerspace Playbook (**makered.org/youth-makerspace-playbook**): Fill out the online form to let makerspace organizers know what you have to offer. The entire Maker Ed's site is full of resources and suggestions for ways to get involved; profiles of existing makerspaces are housed along with advice on how to set up a makerspace if your community doesn't already offer one.

The NextFab makerspace in Philadelphia has two locations; their North 4th Street location is home to an impressive jewelry space, and hosts weekly open studio nights. Photo by Judah Konigsberg.

in the membership fee; private space may cost more. For a small monthly fee, Hughett has a lockable "vault" at the Milwaukee space. For him, the makerspace is a complement to his home studio. Having access to the equipment is great, he says, but at times, people coming to chat or the noise from machines can be a distraction from his work.

The free stuff

Parts, equipment, scraps, and tools find their way into makerspaces. The Houston Makerspace's jewelry studio was fully stocked when Lewis arrived. Hughett stocked 90 percent of the Milwaukee jewelry station with his own stuff, but others have donated equipment, and Hughett can request equipment from the nonprofit's board. The board decides what communal equipment to purchase with money from member dues.

The Milwaukee Makerspace also has "hack racks" — shelves of free stuff — at every station. "So, if you need a motor, you come here and just take a motor," Hughett says. "It almost feels like you're stealing, but you're not. They want you to play. You're here to have fun."

What about the tools?

Exposure to new tools is a huge benefit of a makerspace, says Mohammadi. A CNC mill or a laser cutter "might seem weird and kinda techie," she says. "You might not have thought about what would happen if you included that tool in your work." She knows jewelers who have used a CNC mill to increase efficiency and expand their range of materials. In general, she says, a makerspace gives you the chance to play with tools that are too pricey for your home studio. Many makers had their first crack at a 3D printer at a makerspace.

a makerspace near you

There are makerspaces around the United States and beyond — too many to list in one article! Use your web savvy and phone skills to find one in your neighborhood. A good place to start is **spaces.makerspace.com/makerspace-directory**. Here are just a few active, thriving makerspaces in the U.S.:

Sebastapol, Calif.
Chimera Artspace
www.chimeraarts.org
6791 Sebastopol Ave.

Baltimore, Md.
Baltimore Node
www.baltimorenode.org
2106 North Lovegrove St.
OpenHack: Thursdays, 7 pm

Columbus, Oh.
Columbus Idea Foundry
www.columbusideafoundry.com
421 W. State St.

Philadelphia, Pa.
NextFab
www.nextfab.com
2025 Washington Avenue and
1227 North 4th St.,
Open Studio (at North Fourth
location): Wednesdays, 6–8 pm

Austin, Texas
ATX Hackerspace
www.atxhs.org
9701 Dessau Road
Open House: Tuesdays, 8–11 pm

Houston, Texas
Houston Makerspace
www.houstonmakerspace.com
3605 Texas St.
Maker Market & Open House:
every 3rd Saturday of the month,
12–6 pm

Milwaukee, Wis.
Milwaukee Makerspace
www.milwaukeemakerspace.org
2555 S. Lenox St.
Open to the public Tuesdays &
Thursdays, 7 pm.

Milwaukee Makerspace member Jon Hughett built a four-station jeweler's bench for the organization.

At the Milwaukee Makerspace, tools are either donated or purchased by the organization's board using members' dues.

Hughett recommends keeping anything breakable in a safe storage area. It's OK to label things that you own, and it's reasonable to expect that some things stored at the Milwaukee Makerspace aren't for communal use. But every space has its own culture, so it's wise to talk to members to get a sense of the community norms.

Sign me up

The best way to find a local makerspace is online. The overall tech-centric nature of the makerspace movement means that it's a rare space that does not have a web presence. You can also contact libraries, museums, arts centers, and community organizations to see if there's a space near you.

Many makerspaces have a public meeting/Show & Tell night where members talk about the projects they're working on. The collaborative approach to ongoing work is genuine, and designed to keep people involved. Hughett says it's common for new people to get excited but then drop out because they don't know what to make. Instead, he encourages new visitors to join in on a project being done by an established member and see what comes of it.

"A lot of people who go to makerspaces are there because they appreciate the community of makers," says Mohammadi. In addition to simply striking up a conversation, she recommends getting a tour of the space and looking at a class list to see if one appeals to you.

Mentorship is built into the social contract at makerspaces. But exactly what that looks like is up to the individuals. Some spaces, like Houston's, offer formal group classes complete with syllabus and materials fee. Elsewhere, members may barter lessons, stuff, and/or work. Or, individuals may charge a small fee for one-on-one training. Most often, people simply share knowledge for the sake of sharing.

"It's exciting to be able to find collaborators," says Mohammdi, "because oftentimes, making art is a solitary activity." When you're brought into a communal space, she says, you might find people who are doing completely different things but have a similar aesthetic. That flashpoint of creativity means a new world of possibilities.

"It's as much about makers getting in that space and being inspired by other art forms as it is about makers getting in that space and inspiring other members," says Mohammadi. Expect that members will want to know what you're doing and how you're doing it, and that they'll be thinking about how they could apply it to their own work. Says Mohammadi, "Whether you're an electronics person or a jeweler, the whole movement is about getting around other people who are celebrating that ability to make things with their hands." AJ

take me to the maker faire

In addition to individual makerspaces, there are maker fairs (or faires) held all over the world. As is typical of the movement, most of these fairs are independently produced, organized, and hosted. Fairs range from community-based "mini fairs" to Flagship MakerFaires run by Make Media; you can find an up-to-date listing of fairs as well as information on how to organize an event in your own community at **www.makerfaire.com/global**.

ASK THE AUTHOR: KRISTIN SUTTER

What professional mistake has taught you the most?

"Talking instead of listening. Some of the best advice I ever got was: 'Don't fill the silence when you're interviewing someone. Ask a question, then wait for an answer.' I've found this to be invaluable in all aspects of life."

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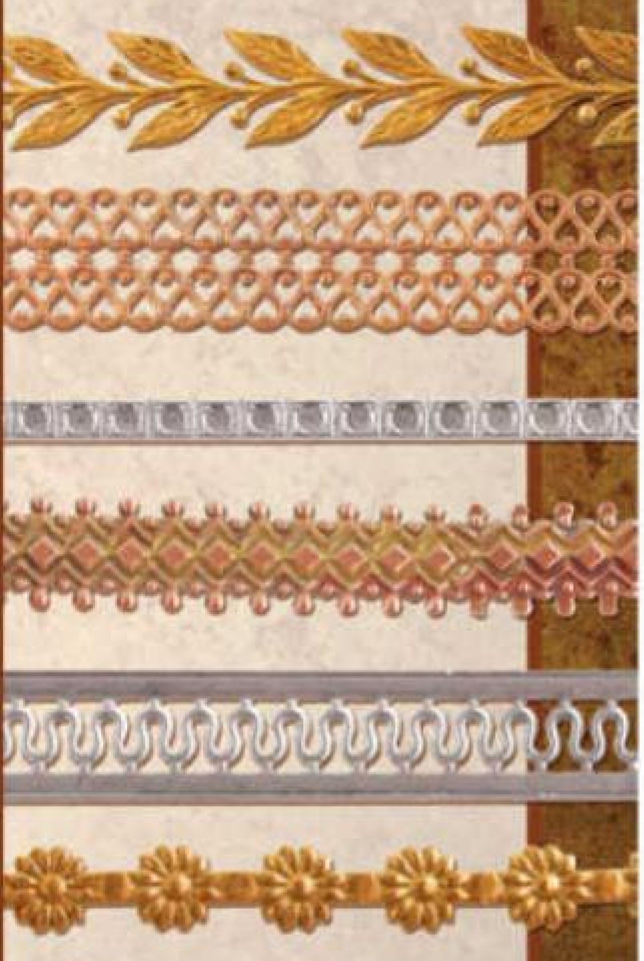

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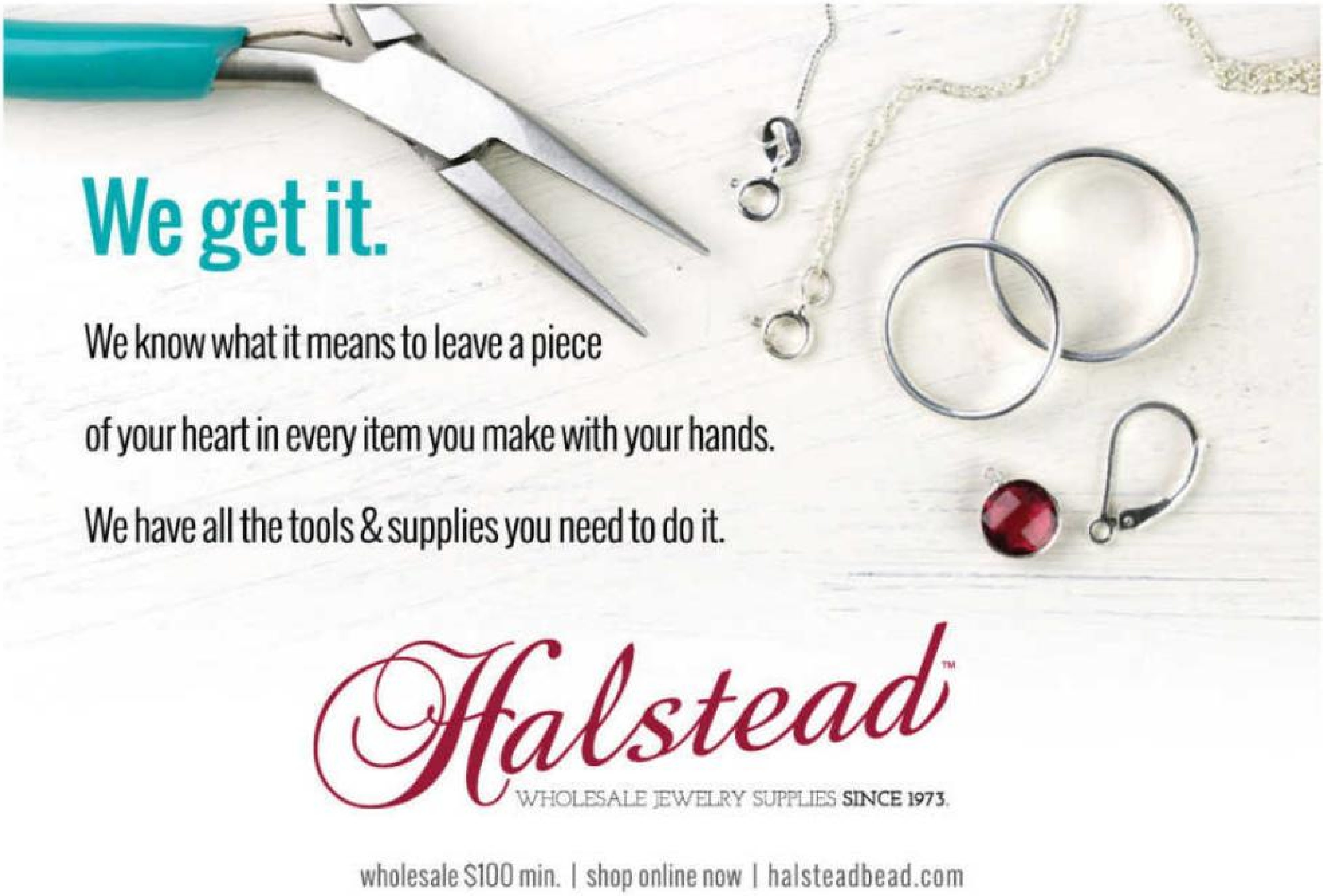

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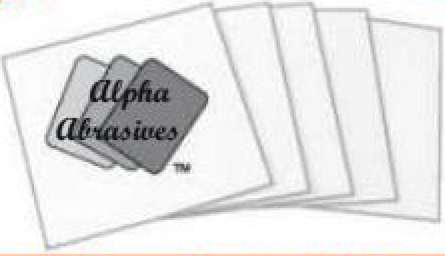

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No matter what medium you work in, there are some jewelry-making techniques that are so essential, you'll use them in nearly every project you make. These tutorials will walk you through the beginner techniques that you'll need to learn in order to make the projects in this issue.

metalworking techniques

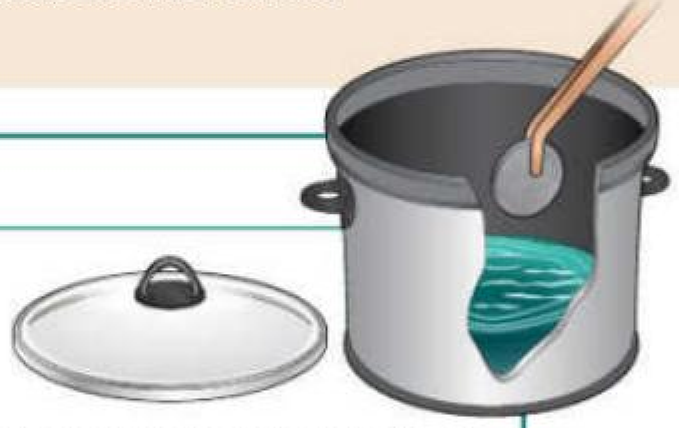
SOLDERING

Use 400-grit sandpaper to clean the metal you plan to solder. Solder won't fill gaps; surfaces must be clean and in complete contact with each other for solder to flow. Apply flux to the metal to prevent oxidation and to help solder flow. Heat the entire piece evenly, not just the solder, and keep the torch moving in a circular motion.

If there is more than one solder join in a piece, solder the first using hard solder, the second using medium solder, and the third using easy solder, as hard solder has the highest melting point and easy solder has the lowest. To keep the solder in previous joins from flowing when you heat the metal again, apply antiflux to those areas.

During soldering, the solder will flow toward where the heat is the greatest. If your solder is flowing in the wrong direction, adjust the direction of your flame.

Once the solder flows, quench the piece in water. Then, place it in a pickle solution to remove oxidation and flux residue. Rinse the piece in clean water.



PICKLE

Pickle is a mildly acidic solution that cleans oxides from metal by removing small amounts of copper. It is generally sold in powdered form and is available from jewelry supply companies. To make pickle, follow the manufacturer's instructions to mix the powder with water in a pickle pot dedicated to non-food use.

If steel (binding wire or tweezers) comes in contact with used pickle, it can cause a chemical reaction that will copperplate whatever metal is in your solution. To prevent this, use copper or plastic tongs to place metal in the solution.

SAWING

Select a saw blade that is the correct size for the gauge (thickness) of metal that you are going to cut.

To thread a saw blade, insert the blade with the teeth of the blade facing down and out, away from the frame, into the top wing nut of the saw frame. Tighten the wing nut. Brace the handle in the hollow of your shoulder, and apply pressure to the saw frame against your bench pin. Maintaining pressure, insert the bottom of the blade into the wing nut closest to the handle, and tighten the wing nut **[Figure 1]**.

The blade should be taut and should make a high-pitched "ping" sound when you pluck it with your thumbnail. If you get a dull "twang" instead, reinstall your blade while putting pressure on the saw frame. Then, lubricate the blade.

When sawing, maintain an erect sitting posture with the top of your workbench at upper chest level. Slouching or having your work too low causes back and wrist strain and leads to broken blades.

To saw, grip the saw frame loosely. Use long, smooth motions, using as much of the blade as possible. The blade will work best when it's perpendicular to the metal **[Figure 2]**. Putting excessive pressure on the saw frame will make you work harder. Turn corners by sawing in place while slowly turning the metal; trying to turn the saw will break the blade.

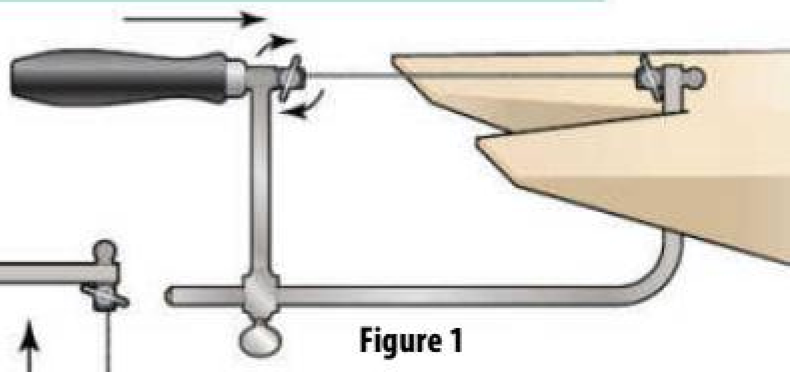


Figure 1

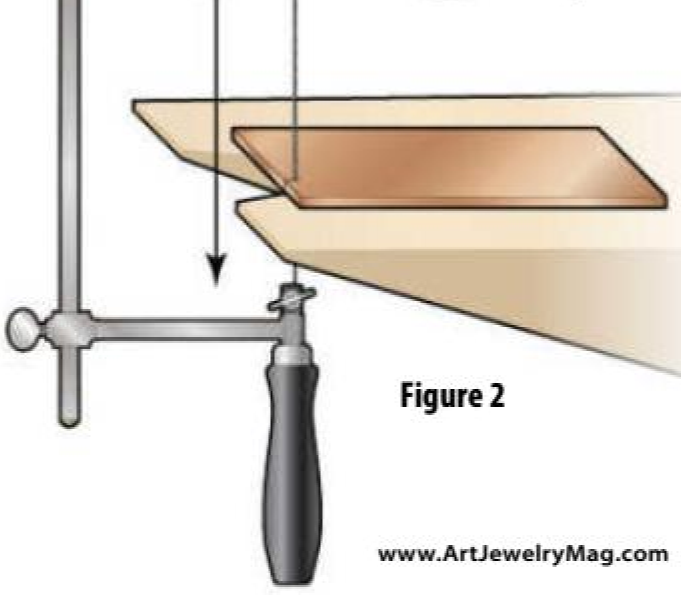


Figure 2

SWEAT SOLDERING

Apply flux to both metal pieces you want to join. Place the smaller piece on a soldering pad. Heat the piece until the flux is a white crust. Place pallions of solder on the smaller metal piece, and heat it until the solder flows **[Figure 1]**. Using soldering tweezers, position the smaller metal piece solder-side down on the larger piece. Heat both pieces from above and below (if using a tripod) until the solder melts again **[Figure 2]**. A bright line of silver will appear at the edge where the two metal pieces meet, and the smaller piece may drop slightly to indicate that the solder has reflowed.

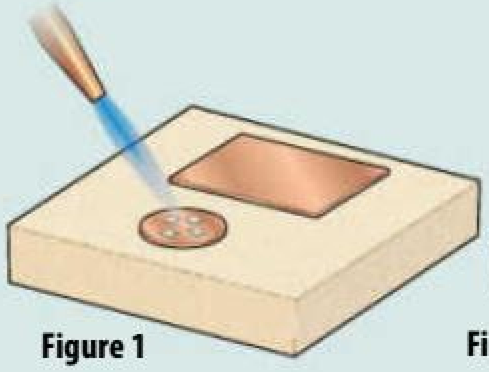


Figure 1

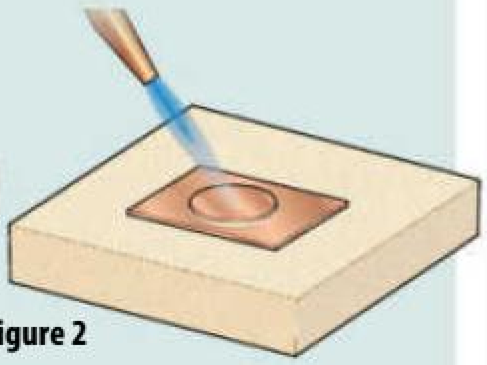


Figure 2

ANNEALING

Annealing restores malleability to work-hardened metal. Place the metal on a soldering pad and heat it with a torch. When the metal has a dull, rose-colored glow, it is annealed. Quench the metal in water.

safety basics

Metals

- Wear eye protection at all times while working with metals, wire, and metalsmithing tools.
- Wear a non-flammable apron to protect your clothing.
- Tie back long hair.
- Work in a well-ventilated area at all times.
- Wear closed-toe shoes.
- Do not wear clothing or jewelry that might get caught in machinery or catch fire.

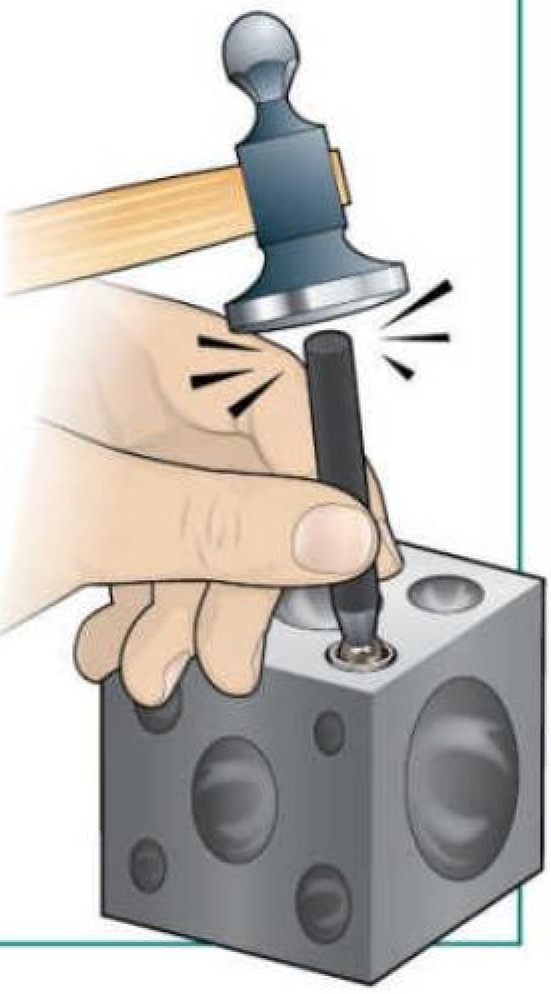
All media

- Wear a dust mask while working with materials and tools that generate particulates.
- Read all Safety Data Sheets (SDSs) before using a new material, and keep a copy of the SDS for any material you use.
- Do not use tools or chemicals in ways that are contrary to the manufacturer's intended purpose.
- Wear protective gloves while handling caustic materials or chemicals.
- Keep a properly rated fire extinguisher and a source of clean water near your workstation.
- Keep cutting tools sharp and all tools and equipment properly maintained.

USING A DAPPING BLOCK

Place a disk of metal over the dapping depression it most closely matches in size. Choose a punch that is slightly smaller than the depression. Set the punch on the disk, and strike the punch with a chasing hammer or mallet until the metal sinks into the depression. Your first blow will make a shallow indentation; each successive blow will carry that indention inward toward the center of the disk.

When the metal conforms completely to the depression, move it to the next smaller depression in the block and switch to a smaller punch. Form the dome in stages until you have achieved the desired size and shape.



wirework techniques

MAKING JUMP RINGS

Select a wooden dowel with a diameter that matches the inside diameter of the jump rings you want to make. Drill a hole through one end of the dowel. Insert the end of the wire into the hole to anchor it to the dowel. Wrap the wire around the dowel, keeping the coils tight against one another **[Figure 1]**.

Cut the wire at the end that anchors the coil. Slide the coil to the opposite end of the dowel. Secure the dowel against the V notch in your bench pin, and use a jeweler's saw with a 2/0 blade to cut a shallow, vertical slot at the end of the dowel to guide your blade as you cut the coil.

Hold the coil and dowel in your nondominant hand. Saw through the top of the coil, feeding the coil toward the slot in the dowel **[Figure 2]**. Be careful not to cut the jump rings in half.

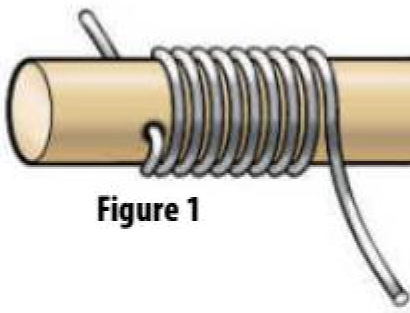


Figure 1

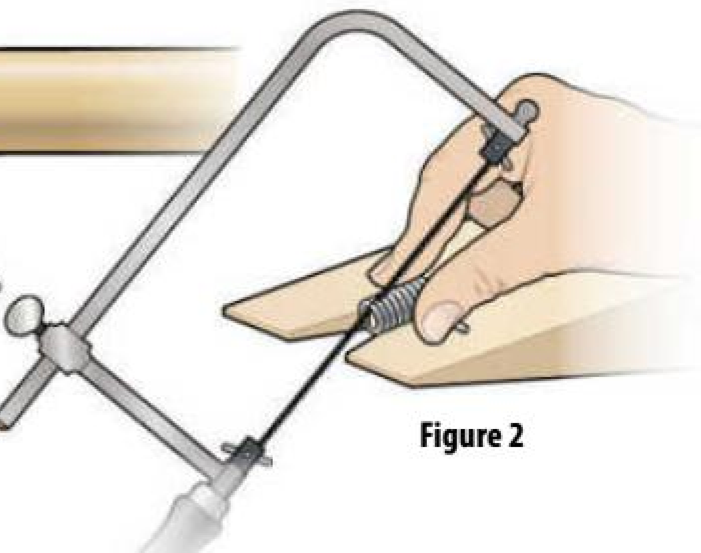
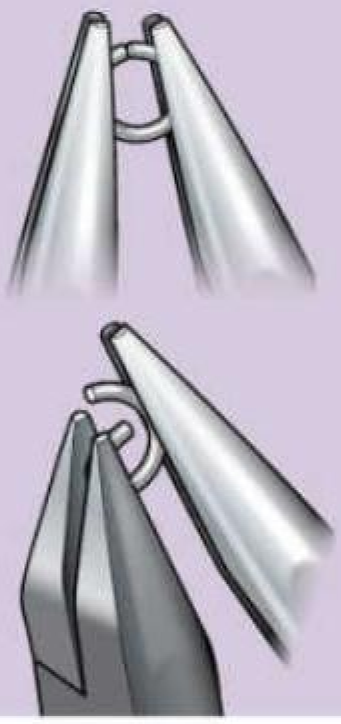


Figure 2

Subscribers: See everything in these toolboxes and download a PDF at **www.artjewelrymag.com/reference.**

OPENING AND CLOSING A JUMP RING

Hold the jump ring with two pairs of chainnose pliers. To open the jump ring, bring one pair of pliers toward you and push the other pair away from you. Reverse the steps to close the jump ring.



toolboxes

Chain mail

- Awl or scribe
- Needle files
- Pliers (2 pairs): bentnose, chainnose, or flatnose
- Reading or magnifying glasses
- Shock-absorbing surface (bead mat or towel)
- Tumbler, steel shot, burnishing compound

Finishing

- Brass brush
- Copper tongs
- Files: hand, needle
- Flex shaft or buffing wheel, buffs, and polishing compounds
- Liver of sulfur or a different type of patina, lidded glass container
- Microcrystalline wax
- Polishing cloth
- Polishing papers
- Sandpaper: various grits
- Scouring pad
- Steel burnisher
- Steel wool
- Tumbler, steel shot, burnishing compound
- Ultrasonic cleaner

Sawing/Piercing

- Adhesive bandages
- Alligator tape (optional)
- Bench pin
- Center punch: manual or automatic
- Dividers
- Files: hand or needle
- Flex shaft, drill bits
- Jeweler's saw frame, saw blades
- Lubricant or beeswax Rubber cement or glue stick
- Safety glasses

Soldering/Annealing

- Anti-flux
- Binding wire
- Borax (for borax and alcohol solution)
- Copper tongs
- Fire-resistant surface: soldering pad, firebrick, or charcoal block
- Flux, flux brush
- Pickle pot with pickle
- Solder: hard, medium, easy
- Soldering pick
- Striker: manual or automatic
- Third hand, insulated cross-locking tweezers
- Torch, various tips
- Sandpaper: various grits
- Tumbler, steel shot, burnishing compound

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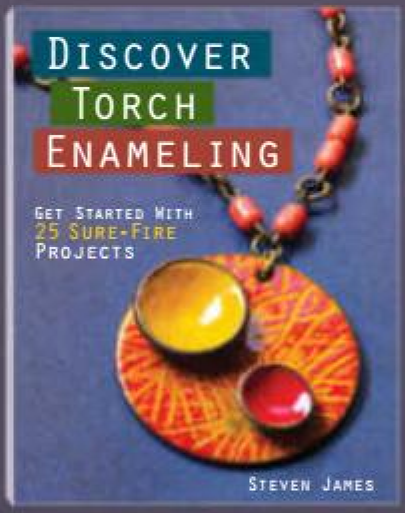

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GALLERY

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- Norman Man, www.facebook.com/waclaw.cycko

- Ali Wieboldt, etsy.com/shop/aliwieboldtjewelry
- Angela Garrod, www.clayninepolymerdesigns.co.uk
- Annie Pennington, www.anniepennington.com
- Helen Breil, www.helenbreil.com
- Liz Hall, www.lizardsjewelry.com
- Ann Marie Cianciolo, annsjewelry.com
- Joan Tenenbaum, www.joantenenbaum.com
- Laritza Garcia, laritzagarcia.com

suppliers

MAKE YOUR GOLD GO 4X FURTHER

page 29

- Silver and gold sheet: Hoover and Strong, www.hooverandstrong.com
- Pickle (PhDown): local pool supply store
- Rolling mill: Otto Frei, *below*
- Rolling mill textures: local craft store, fabric store, or found materials
- All other tools and supplies: Rio Grande, *below*

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- Otto Frei: 800.772.3456, www.ottofrei.com
- Rio Grande: 800.545.6566, www.riogrande.com

TAKE A PAINTERLY APPROACH TO MIXING METALS

page 38

- Aura 22, PMC3 slip, charcoal blocks, copper sheet, Smith #4 torch tip: Rio Grande, *below left*
- Acetylene torch (Smith, Goss, Prest-o-Lite, with largest tips); Propane/Map/Map Pro torch (E-Z Torch [ORCA]): Otto Frei, *below*; Contenti, contenti.com
- Metal clay supplies: Rio Grande, *below left*; Cool Tools, www.cooltools.us; Fire Mountain Gems, www.firemountaingems.com; Amazon, www.amazon.com; Art Clay World, www.artclayworld.com

GIVE KEUM-BOO MORE DEPTH WITHOUT MORE GOLD

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- Needles and cutting mat: local craft or jewelry supply store
- Tools: Sea Force, www.seaforce.co.jp; or general jewelry suppliers, *below left*.
- Gold and silver foils: Sato Kinginten, phone 0338823755 (Japan); or general jewelry supplier, *below left*

CHANGE UP YOUR CHAIN MAIL WITH TWISTED RINGS

page 50

- Jump rings and S-hook clasps: Weave Got Maille, weavegotmaille.com
- Tools & scrap wire: Local bead shop

BOXES & LOCKETS: MESSAGE TUBE LOCKET

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- Silver, copper, flux, yellow ochre, Bur-Life, solder, additional tools: Rio Grande, *below left*
- Half-round pliers, assorted hand tools: Grobet, www.grobetusa.com
- #220 adhesive sandpaper rounds, needle files: Home Depot, www.homedepot.com

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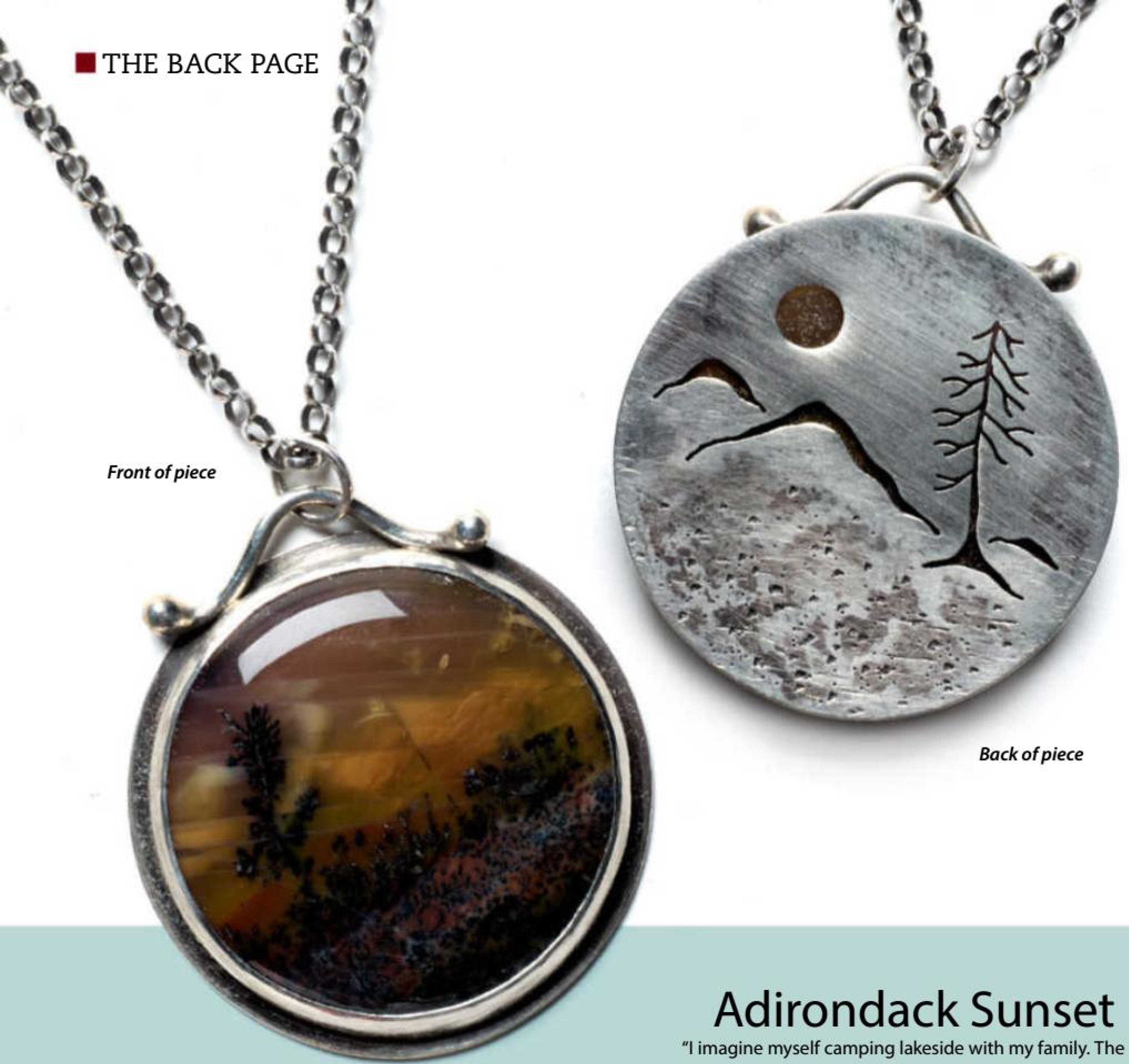

Front of piece

Back of piece

Adirondack Sunset

"I imagine myself camping lakeside with my family. The kids are tucked in for the night, leaving behind the silence that only a parent could appreciate. Nestled into my fireside chair with a glass of wine, I peacefully enjoy the view of the marshy end of the lake. The silhouette of a lone tamarack makes a statement against the changing sky. The silence is broken only by the crackling of the fire as the sun slowly creeps down below the horizon, illuminating the distant peaks."

Julie Leininger, an environmental engineer turned jewelry artisan, describes the vision she summoned when she first held this agate cabochon in her hand and the creative spark for this piece struck. Taking cues from the cab itself, she pierced the back of the pendant to complement the beauty of the stone. And, to invite the wearer into her vision, she added a pierced moon to the backplate; when the pendant is held up to a light, the moon glows. —*Annie Pennington*

AT A GLANCE

Title: Adirondack Sunset

Artist: Julie Leininger

Info: Sterling silver, Burro Creek agate; 34 mm (about 1⅜ in.) diameter

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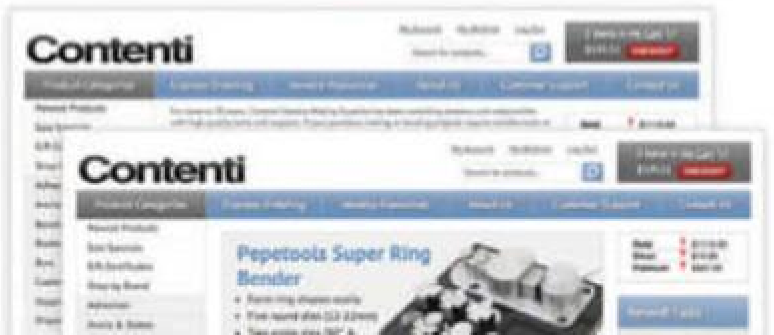

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